

# The adoption of application service provision in small and medium-sized enterprises

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# THE ADOPTION OF APPLICATION SERVICE PROVISION IN SMALL AND MEDIUM-SIZED ENTERPRISES

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# Abstract

While the importance of innovation to organisational competitiveness and effectiveness is widely acknowledged, understanding of information system (IS) innovations in small and medium-sized enterprises (SMEs) is relatively undeveloped. SMEs constitute the bulk of enterprises around the world, making significant contributions to economies, yet research coverage is often focused on large firms. This thesis contributes to understanding of IS innovations in SMEs by investigating application service provision (ASP) in the SME context. Core to the ASP concept is the novel exploitation of the internet as a medium for IS application delivery and access which enables SMEs to rent computer applications from third-party providers.

An exploratory, interpretive research method is employed to understand ASP in SMEs. Case studies in twelve SMEs were conducted, gathering data from SME owner-managers, ASP solution managers and users about their experiences with ASP. Four theatres, three service firms, two life-style firms, one specialist trader, one IT service provider and one research firm constitute the sample. The two life style firms, the IT service provider and one service firm are micro enterprises employing fewer than ten people. One of the theatres, the research firm and one of the service firms are small enterprises employing between ten and forty-nine people. The remaining five firms are medium-sized enterprises employing more than fifty but fewer than two-hundred fifty people. These SMEs have adopted e-ticketing, e-payment, e-mail, e-supply, e-SMS and e-stats ASP-based applications. Common themes emerge from cross-case analysis that systematically compares and contrasts data from the twelve SMEs.

The analysis uncovers that adoption, implementation and use of ASP in SMEs can be synthesised to a model of the IS innovation life-cycle for SMEs. The fundamental elements of this life-cycle are adoption instigation, realization through implementation and continuing infusion through operation and consequences. Triggered and continuous informal evaluation can prompt SMEs to make amendments to, or discontinue the use of, an IS innovation. While the IS innovation life-cycle demonstrates the generalisability of the findings, the thesis also reveals similarities and differences between micro, small and medium-sized firms in terms of ASP adoption, implementation, operation and consequences.

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Das Außerordentliche geschieht nicht auf glattem, gewöhnlichem Wege.
Johann Wolfgang von Goethe (1749-1832)

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# CHAPTER ONE: INTRODUCTION

In 1998, an information systems (IS) innovation, termed application service provision (ASP), emerged receiving much attention in the computer press and from information system providers in the following years. ASP enables the rental of computer applications over a public network such as the internet. A third-party vendor, labelled an application service provider, runs the computer applications on a central server and acts as an application host to the buyer of the application service. For the ASP Industry Consortium (2001) application service providers 'manage and deliver application capabilities to multiple entities from a data centre across a wide area network'. The buyer of the application service becomes a regular client of the ASP provider, typically paying a monthly fee for the provision of the application service. The client accesses the application and data stored via a Web browser.

The ASP evolution is driven by three major factors: enabling technologies such as the ubiquity of the internet and increasing bandwidth capacity; technical ASP issues such as shortage of skilled information technology (IT) labour; and business ASP drivers such as minimising total cost of ownership (Cherry Tree & Co., 1999). Together, these factors open the ASP rental option to small and large organisations alike. For small and medium-sized enterprises (SMEs) the ASP concept is particularly appealing: it presents new opportunities for SMEs to procure applications (Currie & Seltsikas, 2001) and, thus, can be an alternative to complex and costly IT acquisition and implementation (Heart & Pliskin, 2002). As a result, many application service providers target SMEs by offering applications that SMEs normally cannot afford (Kern, et al., 2002a). Indeed, SMEs were the majority of customers of early standard application service providers (Everett, 1999) benefiting from a reduced reliance on in-house IT staff and, thus, being able to focus on their core business.

When the concept of renting applications from third party providers emerged, ASP became 'one of the most popular acronyms of the early dot.com era' (Currie, 2004a, p.239). Commercial research organisations such as Gartner Research, IDC, and Dataquest predicted an ASP market worth up to $48 billion by 2003/2004. These projections however did not materialise - ASP providers failed to attract a sufficient number of clients and the ASP industry was in a shake-up stage by 2003. While many ASP providers, such as Futurelink, disappeared as a result of this industry shake-up,

acquisitions and consolidations took place among the surviving providers. A prominent example is Netstore Group plc, a stock market listed ASP provider. In 2000, UK-based Netstore was one of the world's largest ASP providers with an active user base of about 18,500 (Wainwright, 2000). In 2003, Netstore was acquired by the hosted services provider Cobweb Solutions.

Following the industry shake-up, ASP appeared to be an obviously beneficial innovation that never diffused widely. Yet, the value promise of the ASP concept seems too compelling to be ignored by organisations (Kern, et al., 2002c), and ASP started to resurface in 2004. ASP providers such as Netsuite (www.netsuite.com) are among the fastest growing technology companies in 2005. While it may not be called ASP but software-as-a-service, hosted services, or something else, the promise today is the same as it was in 1998 - online provision of computing. With more organisations looking to service providers to fulfil their IT needs ASP, the 'compelling new technology concept for managing computer operations' (Curtis, 2000, p.35) as it was termed in 2000, is continuing its diffusion.

This research presents the findings from a study of ASP in SMEs. It aims to provide understanding of the issues that SMEs experience when they adopt computer applications that are procured via the ASP model. Research on ASP in SMEs is needed as the ASP concept is geared towards SME customers but few SMEs have actually adopted ASP-based applications (Kern, et al., 2002a, Currie, 2004). This lack of adoption is even more daunting considering that many providers target this customer segment.

On a more detailed level, the thesis aims to uncover the various phases that SMEs go through when they adopt ASP-based computer applications. It seeks to identify the underlying motives for ASP adoption and aims to explore what is happening in the SMEs following the adoption decision. This focus on the entire life-cycle of ASP-based applications in SMEs addresses different shortcomings in the literature. First, and foremost, it provides understanding about ASP in an SME context. Second, it allows conclusions to be drawn about the diffusion process of IS innovations, such as ASP, in SMEs. Third, it considers the effects that IS innovations have for SMEs, contributing to an underrepresented area in the innovation diffusion literature (Rogers, 2003).

## 1.1 Research context

Since ASP is an emerging innovation existing literature is limited, which opens numerous avenues for research. This thesis aims to exploit this opportunity for research by investigating the diffusion of ASP among SMEs. Emerging literature on ASP shows a substantial lack of empirically-grounded research regarding ASP in SMEs. Most contributions on ASP are based on evidence from ASP providers and merely emphasise the suitability of the ASP concept for the purposes of SME clients. Existing literature provides little empirical evidence from SMEs about ASP, and is therefore extremely limited, a notion supported by Lockett et al. (2006). Additionally, few empirical studies exist which examine how IS innovations such as ASP, come to be adopted and diffused across SMEs. Hence, the objective of this thesis is 'to investigate the diffusion of ASP among SMEs'. This objective incorporates three main elements: the IS innovation ASP, the SME context, and diffusion of innovations theory. These three elements are discussed in greater detail below.

### 1.1.1 ASP

ASP is a novel model of computing targeted at organisations. In a traditional computing environment, computer applications can be installed and run on client machines or on in-house servers. ASP changes this traditional approach to application hosting: it enables firms to rent externally-hosted applications from third-party ASP providers and access these applications over a network. The new aspect that classifies ASP as an innovation is the delivery mechanism over the internet - computer applications provided as a service, hence the term application service provision.

Under the ASP model, computer applications are hosted by specialised third-party ASP providers. These providers run the applications on central servers in remote data centres. Clients access these applications and data is stored via web browsers that connect to a network, which in most cases is the internet. Remuneration for ASP services is usually a fixed cost per month calculated on a per user or per use basis.

ASP was hailed a revolutionary innovation that would change IS provision predominantly for SMEs. This pro-ASP bias, typical of practitioner and early academic ASP literature, is pointing to the need to explore the adoption of ASP in SMEs. Investigating the effect both, positively and negatively, that ASP adoption has on SMEs

is expected to provide some evidence for the potential of ASP to change IS provisioning in SMEs.

### 1.1.2 SMEs

The second element of the research is the SME context. In the European Union, organisations qualify as SMEs if they employ fewer than 250 people and have an annual turnover not exceeding 50 million Euros, and/or an annual balance sheet total not exceeding 43 million Euros (European Commission, 2003). SMEs account for a large share of organisations in economies. In Europe, for example, SMEs constitute at least 95% of enterprises (Storey, 1994). In the UK, the vast majority (99%) of businesses are SMEs and in 2004, there were only approximately 6000 firms that had more than 250 employees (Small Business Service, 2005b). Several key characteristics distinguish SMEs from larger organisations: SMEs are usually independent businesses that are heavily influenced, and often managed by, their owners or part-owners (Bolton, 1971, Small Business Service, 2005b). Additionally, SMEs tend to have a small market share and suffer from resource poverty (Burns, 2001, Levy & Powell, 2005).

Even with the significance of SMEs for the vitality of economies, the importance of SMEs to the economy is often underestimated and research on SMEs is not representative of their importance to economies (Storey, 1994). Despite increasing academic interest in SMEs, research remains fragmented and full maturity has still to be achieved (Curran & Blackburn, 2001). The types of organisations included in this research are SMEs as the ASP model is targeted at SMEs, yet evidence from SMEs about ASP is scarce in the academic literature (Lockett, et al., 2006).

### 1.1.3 Diffusion of innovations theory

The theoretical premise of this research is diffusion of innovation theory with the objective being to investigate the diffusion of the ASP innovation among SME organisations. Innovation diffusion is concerned with the spread of innovations through social systems over time. This primarily involves examining the process of adopting and implementing an innovation. As the diffusion of ASP is studied among SMEs, organisational models of the innovation process are applicable. Rogers' (2003) model of the innovation process in organisations, a contemporary stage model that incorporates

the general pattern of stages in the process, is employed for the purposes of the research. This model identifies the main sequence of decisions, actions, and events that occur over time when an organisation adopts and implements an innovation. Diffusion of innovations theory is well established and has been used widely in information technology research (Mustonen-Ollila & Lyytinen, 2003) and offers a solid theoretical basis for researching the ASP adoption process in SMEs.

As ASP is an IS innovation, literature on the diffusion of IS innovations is also relevant. Few empirical studies exist examining how IS innovations come to be adopted and diffused across organisations (Currie, 2004a). Even less knowledge is available about the diffusion of IS innovations among SMEs. This fundamental lack of research on IS innovations in organisations warrants an empirical investigation of the diffusion of ASP among SMEs. The findings from this study are expected to narrow the existing knowledge gap on IS innovation diffusion in SMEs.

## 1.2 Research questions

The emerging innovation, ASP, offers many opportunities for research. As SME research remains fragmented and has, by far, not reached full maturity, SME studies are a contribution per se. This chapter recognises a lack of empirical evidence about ASP in SMEs and acknowledges a lack of knowledge about the diffusion of IS innovations among SMEs. With this theoretical basis the research question becomes 'How does an IS innovation, ASP, come to be adopted by, and diffused within, SMEs?' This research question captures the fundamental stages of the innovation process in organisations. There are four sub-questions that complement the main research question. The first two questions, 'Why do SMEs adopt ASP?' and 'How do SMEs implement ASP?' refer to the adoption and implementation of the IS innovation in SMEs. The third and fourth question, 'How do SMEs manage ASP on a day-to-day basis?' and 'What are the consequences for SMEs of adopting and implementing ASP?' foster understanding of operational issues and ASP outcomes for SMEs. Innovation process models for organisations usually do not cater for consequences organisations face from the adoption and implementation of innovations. Sub-questions three and four are posed to address this scarcity of understanding.

These questions emerge from the review of the literature and aim to narrow the knowledge gaps. The principal gaps in terms of theory are the lack of understanding about how ASP is used in the SME domain and the need for insight into the ASP diffusion process in SMEs. In practice, this sheds light on whether ASP can revolutionise IS provisioning for SMEs. The findings on the effects of ASP-based applications (such as benefits and disadvantages) may aid SME owner-managers who are considering the adoption of ASP.

## 1.3 Research method

A multiple case study research strategy involving twelve SMEs is adopted for this research based in an interpretive paradigm. The case study approach is well suited as ASP is a technology related innovation that is being studied in an organisational context (Darke, et al., 1998) and it is a research area where theory is at an early, formative stage (Benbasat, et al., 1987, p.369) Given the lack of current knowledge about ASP and SMEs an exploratory research approach is chosen. The exploratory, interpretive, multiple case study strategy furthermore addresses a shortcoming of the innovation diffusion domain: it is a qualitative, non-positivist research approach contributing to a discipline that is dominated by one-shot surveys (Rogers, 2003).

One of the challenging phases of this research project was to identify potential SME participants as few SMEs have adopted ASP-based applications. Further, while some 99% of organisations in the EU are SMEs, knowledge about ASP adoption is not available in the public domain: SMEs tend not to publicise the fact that they have adopted ASP-based applications. In some instances, providers do advertise that they have SME customers, but those providers are protective of their customers, mostly unwilling to supply contact details. For these reasons, the sampling strategy is driven by access rather than by theory. Once SMEs had agreed to participate in the study, data was obtained in semi-structured interviews with SME owner-managers and key personnel responsible for the adoption, implementation and operation of the ASP solution.

One of the contributions of the method section is an analysis of research strategies and techniques employed in IS in SMEs research. This allows conclusions to be drawn

concerning the quantity of IS and SME research in different disciplines and research methods and techniques used by investigators.

## 1.4 Chapter summary and thesis structure

This chapter provided an overall introduction to the thesis. It argues that ASP is an emerging IS innovation that is targeted at SMEs. Yet, empirical evidence from SMEs about ASP is scarce and in-depth understanding is required, particularly as research about SMEs remains immature. A diffusion approach, employing diffusion of innovations theory, is proposed. It is expected that in-depth understanding will be obtained by observing and analysing the ASP process in SMEs. The chapter concludes with an outline of the thesis.

### 1.4.1 Thesis structure

This thesis has the following structure: Chapter two provides a critical synthesis of relevant literature about SMEs, IS and ASP and discusses diffusion of innovation theory. The chapter commences with an introduction to SMEs including a definition of SMEs, characteristics associated with SMEs and a discussion about the SME lifecycle. The chapter continues with innovation and innovation diffusion theory: first innovation is defined and three dominant innovation research clusters are identified. Then innovation diffusion and innovation processes in organisations are discussed. As ASP is an IS innovation, the chapter continues with IS, describing IS types and reviewing IS and their positioning in organisations. The following section on IS innovations includes diffusion of IS innovations. The chapter concludes with definition, characteristics and development of ASP.

Chapter three reviews innovation, IS and ASP in SMEs and proposes a conceptual framework. The chapter uncovers a scarcity of empirical evidence about ASP from SMEs. Additionally, it reveals that knowledge about the IS innovation process in SMEs is fragmented and adoption-biased. Contributions regarding consequences of IS and IS innovations are particularly in short supply. The conceptual framework developed in chapter three is a process model that consists of three phases: initiation, implementation and consequences.

Chapter four, research method, presents method and research design adopted in this thesis. The chapter begins with a discussion of research paradigms and epistemological approaches to IS research. The chapter analyses research strategies employed in IS research in SMEs. The adoption of a case study research strategy corresponds to the interpretive assumptions. The chapter further discusses research design including the research process, sampling context and method of data collection. Chapter four establishes research validity in the concluding section and discusses methods of analysis.

Chapter five profiles the case firms. It introduces the organisational background of each case firm, describes the IS structure of the SME, and specifies ASP applications adopted. All SMEs are classified into micro, small and medium-sized firms, according to the definition of the EU. Four firms are micro, three firms are small, and five firms are medium-sized. The micro firms use e-payment, e-mail and e-SMS applications. The small firms use e-mail, e-stats and e-ticketing. The medium-sized firms use e-ticketing, e-supply and e-mail.

Chapter six describes and discusses ASP diffusion in micro firms. The chapter first maps the diffusion of ASP at the four firms AQO, KBC, PB and TA, describing adoption, implementation and consequences of e-payment, e-mail and e-SMS ASP solutions. The chapter concludes with a discussion of the emerging diffusion phases at micro firms.

Chapter seven mirrors the structure of chapter six: it presents the diffusion of ASP-based e-stats, e-mail, and e-ticketing solutions at the small firms MP, ZI, and EMT. An analysis of ASP adoption, implementation, and consequences in small firms follows the descriptive presentation of the findings.

Chapter eight concludes the discussion of ASP diffusion in SMEs by describing and analysing e-mail, e-supply and e-ticketing at the medium-sized firms AT, FDL, BLT, NWT, and TRP.

Chapter nine addresses the research sub-questions before turning to discuss the main research question 'How does an IS innovation, ASP, come to be adopted by, and

diffused within, SMEs?' The chapter presents a model of the IS innovation process for SMEs and reviews this model in light of existing literature.

Chapter ten, the closing chapter, details the various contributions made by this study, outlines limitations, and suggests areas for further research.

# 2 CHAPTER TWO: SMES, INNOVATION DIFFUSION, IS, AND ASP

It has been proposed that ASP revolutionises information systems provisioning for small and medium-sized enterprises. As ASP is an emerging innovation, academic interest is, similarly, emerging. Therefore, the review of the literature is divided into two major parts: chapter two, which provides a critical synthesis of the core literature, and chapter three which focuses on the SME context looking at innovation, IS, and ASP in SMEs. Chapter three provides the conceptual framework that specifies the research process and informs the qualitative research approach.

This chapter supplies the basic understanding for chapter three by reviewing the core literature elements: SMEs, innovation, IS, and ASP, synthesising aspects relevant to the study. The chapter commences with an introduction to SMEs. As ASP is classified as an information systems innovation, chapter two continues with an introduction to innovation and innovation diffusion followed by a discussion about information system and information systems innovations. The chapter concludes with an overview of the emerging body of literature regarding ASP.

## 2.1 SMEs

SMEs play a critical role in virtually all the world economies (Brown, et al., 2005, p.76). In the European Union for example, SMEs constitute 99% of all enterprises by number providing around 65 million jobs (European Commission, 2003). In the US SMEs represent 99.7% of all employer firms (Small Business Administration, 2005). Yet, despite the significance of SMEs for the vitality of economies and increasing interest in SMEs among academics and policy makers (Baldwin & Gellatly, 2003, Curran & Blackburn, 2001), the amount of research on SMEs is not representative of their importance to economies (Storey, 1994). This section commences with a definition of the term SME and explores characteristics associated with SMEs. The section then narrates the SMEs life cycle by discussing SME birth, survival, growth and closure.

### 2.1.1 Definition

While there is no uniformly accepted definition of an SME, the official definition by the European Commission is widely accredited and applied across Europe: to be classed as an SME an enterprise has to be independent, employ fewer than 250 people and have an annual turnover not exceeding 50 million Euros, and/or an annual balance sheet total not exceeding 43 million Euros (European Commission, 2003). The European Commission definition differentiates three SME sub-categories: micro, small and medium firms. A micro enterprise is an enterprise that employs fewer than ten people and whose annual turnover and/or balance sheet total does not exceed 2 million Euros. A small enterprise employs fewer than fifty people and has an annual turnover and/or balance sheet total not exceeding 10 million Euros. The remainder of firms with fewer than two hundred fifty employees and an annual turnover not exceeding 50 million Euros, and/or an annual balance sheet total not exceeding 43 million Euros are medium-sized firms. The European Commission considers the staff number criterion the most important and thus key criterion for defining SMEs. Unlike Europe, the US Office of Advocacy defines a small business as an independent business having fewer than five hundred employees (Small Business Administration, 2005). Nevertheless, SMEs in the US still make up 99.7% of the business population.

While SMEs can easily be defined in terms of quantitative measures such as size and turnover, the key problem with quantitative definitions is that they are too all-embracing (Storey, 1994) - in the European Union and the US, SMEs constitute 99% of all enterprises which are virtually all firms. But SMEs, in many respects, are heterogeneous and quantitative definitions do not reflect the heterogeneous character of the SME population. Various attempts have been made to overcome the shortcomings of quantitative SME definitions. In the UK for example, the Bolton Committee (Bolton, 1971) attempted to overcome definition shortcomings back in 1971 by formulating an economic and a statistical definition. The statistical definition distinguishes eight sectors formulating a numerical definition for each sector. A firm in manufacturing or construction, for example, is considered small if it employs fewer than two hundred people. A firm in the retailing sector is small if it has a turnover of less than £50,000 and a firm in the motor trade is small if it has five or less vehicles. The economic definition regards a firm as small if it satisfies three criteria: SMEs a) have a relatively small market share; b) are managed by owners or part-owners in a personalised way and c) are independent, not forming part of a large enterprise. The key problem with

qualitative definitions however is that they defy practical statistical application (Burns, 2001). Hence, size in terms of number of employees remains the key criterion for defining SMEs and the EU definition is a useful, applicable discriminator for management research based in Europe.

The vast majority (99%) of the estimated 4.3 million businesses in the UK at the start of 2004 had fewer than two hundred fifty employees and they provided 46% of the UK non-government employment and 38% of turnover. Almost all of these SMEs (99.3%) were small having between 0-49 employees. Only 26,000 enterprises (0.6%) were medium-sized employing 50-249 employees. Large businesses are in the minority with only approximately 6,000 firms in the UK that have more than two hundred fifty employees. In 2004, large firms accounted for 42% of non-government employment and 48% of turnover (Small Business Service, 2005a). In the US there were approximately 24.7 million businesses in 2004; 5.7 million of these firms were with employees in 2002 and 18.6 million without employees in 2003. The most recent data for the US shows that small firms with fewer than five hundred employees represent 99.9% of the 24.7 million businesses. There are 17,000 large businesses in the US.

### 2.1.2 Characteristics

Despite the heterogeneity of the SME sector, SMEs do have a number of key aspects in common. These defining characteristics are presented in this sub-section.

The first key characteristic, drawing upon Bolton's 1971 criteria of personal influence, is that SMEs are strongly influenced by the personality of their owner-managers (Burns, 2001, Levy & Powell, 2005). Burns (2001) even goes as far as remarking that small firms are an extension of a person and the personality of this person is imprinted on the firm. In many cases this person is the owner or part-owner of the firm. The majority of SMEs are managed by the owner or part-owner hence the term owner-manager. SME managers in contrast are usually employed by the firm and do not own or control the SME. Another term frequently associated with SMEs is entrepreneur. Burns (2001) argues that the major difference between entrepreneur and owner-managers and managers is the degree of innovation practised by the entrepreneur. Entrepreneurs are defined by their actions attempting to profit by risk and initiative. Defined by their actions and character SME owner-managers and managers can be, but are not

necessarily, entrepreneurs. Generally it is acknowledged that the views and values of owner-managers and managers influence all aspects of SME activities. The second key characteristic is that SMEs have a high probability of ceasing to trade (Burns, 1996, Storey, 1994). 50% of businesses being started cease trading within three years of being set up (Burns, 2001) which is a very high figure. An SME-specific key factor influencing failure rates is over-reliance on single customers (Burns, 1996, Levy & Powell, 2005) and limited product range (Storey, 1994). The third characteristic, again drawing upon Bolton's 1971 report, is that SMEs have a small market share (Bolton, 1971, Small Business Service, 2005b). Although difficult to measure and thus little applicable for defining SMEs (Burns, 2001) it is a characteristic. Many SMEs are likely to operate in a single market or a limited range of markets, offering a limited range of products or services (Burns, 1996, 2001). The fourth and final characteristic is that SMEs are typified by resource poverty (Burns, 2001, Levy & Powell, 2005): SMEs often lack financial and skill resources which, for example, inhibits their capacity for change and growth. Access to financial resources is often a particular problem for SMEs.

These characteristics are typical for SMEs. Complementing these characteristics, the aspects presented in the following sub-section focus on distinguishing SMEs from large firms.

### 2.1.3 Differences between SMEs and large firms

Many aspects associated with SME distinguish SMEs from large firms. Storey (1994) for example identifies three key differentiators between SMEs and large firms. First, SMEs have a much greater likelihood of evolution and change than large firms. Particularly during growth periods, the structure and organisation of the SME is more likely to be in a state of change than is the case in large firms. The second differentiator is that SMEs play a different role in innovation than large firms: SMEs are good at providing incremental innovations 'marginally different, in terms of product or service' (p.11/12) and are more likely than larger firms to introduce radical innovations. Large firms on the other hand are more likely to undertake research and development activities and have staff dedicated to research. The third differentiator reflects upon the influence of the owner-manager and the external environment. SME owner-managers have a key influence on the performance of the firm unlike large firms and in particular

stakeholder-owned large firms. SME are also more vulnerable to changes in the external environment especially when they depend on a limited number of customers and products.

Whereas Storey facilitates three key differences between small and large firms, Bridge et al. (2003) identify absence of functional managers, on-the-job learning, investment and resources, discontinuities and informal systems and procedures as further distinguishing differences. All the management of SMEs often resides with the owner-manager; there are no functional managers such as marketing and finance managers which are common for large firms. SME owner-managers also have, unlike in large firms, acquired their knowledge and skills on the job. External investment is not often found in SMEs and money invested is usually personal money of the owner-manager. Due to resource shortages, a characteristic identified in the previous section, change in SMEs is likely to be in response to short-term need rather than the result of long-term strategy. Discontinuities and thresholds occur in SMEs that do not happen in large firms. Examples include extra capacity needed to increase turnover, yet the SME may not be able or willing to provide this capacity as the extra return is not in relation to the extra cost of the capacity. Many SMEs are managed informally and formal systems and procedures tend not to be introduced unless a crisis arises and formal procedures and systems become necessary.

For numerous authors these aspects represent the crucial difference between firms associated with size (Bridge, et al., 2003). It is particularly important to acknowledge that SMEs are not scaled down versions of large firms (Burns, 2001). Penrose's (1959) historical remark that SMEs and large firms are as fundamentally different from each other as a caterpillar is from a butterfly is a widely cherished metaphor still used today to depict the differences between SMEs and large firms. Yet, while caterpillars (SMEs) may develop into butterflies (large firms), many SMEs will remain caterpillars. Following the definition and characterisation of SMEs, the SME life-cycle is presented in the following section. The SME life cycle is characterised through SME birth, static, growth and closure.

### 2.1.4 The SME life cycle

The SME development process (Bridge, et al., 2003) presented in Figure 1 is a representative and easily understandable indicator for the nature of SMEs. When a business is set up, represented by the start-up point in the model, it either remains static often focussing on survival or it can grow. Over time, growing firms may go into a static stage and static businesses may start to grow. SME can also go into decline and unless the trend is reversed and the SME goes back into a growth or static stage, the decline ends in closure of the business. An SME can, for example, go into decline due to losing market share, declining profitability, or loss of management skills. While there are no clear boundaries between the various stages of the model and, it cannot be precisely determined when an SME moves from one stage to another, the model is useful as it maps the SME life cycle: birth, static-survival, growth and closure. The following sub-sections discuss these four stages of the SME life cycle.

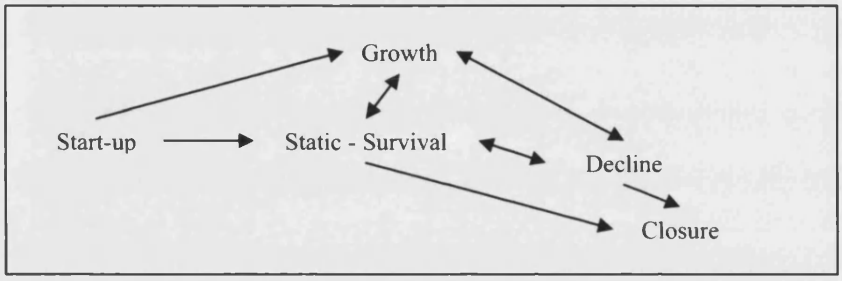


**Figure 1: Small business paths (Bridge et al., 2003)**

#### 2.1.4.1 Birth

Four basic opportunities exist for prospective owners to start an SME: to start a new firm from scratch, to buy an existing firm, to purchase a franchise, or to start a home-based business (Hodgetts & Kuratko, 2001). Most SMEs are started from scratch and the most effective approach is to create a unique product or service that has the potential of creating a great demand. The other approach is to adapt an existing product or service or introducing an existing product or service to an area where it is not yet available. Whereas starting a new firm is popular, buying an existing firm can be one of the easiest ways to become an SME owner as the time and effort associated with starting a new firm are eliminated. Another popular choice for starting a business is to purchase a franchise. A franchise enables a prospective SME owner (the franchisee) to handle a specific product, service or entire business under the supplier's (the franchisor) trade name and guidance in exchange for a fee or commission on sales. The most prominent

example of a franchise business model is the fast food outlet McDonalds. The fourth option is to open a home-based business. A home-based business is operated from the home of the owner. In recent years, internet technologies have fostered the creation of home-based businesses and their numbers are increasing. In the US for example, 53% of SMEs were home-based and 3% were franchises in 2004 (Small Business Administration, 2005).

Formation rates of new firms vary noticeably between sectors (Storey, 1994). In the US, for example, 580900 new firms opened in 2004, which is about 10% of the total business population (Small Business Administration, 2005). Major small business sectors are manufacturing, merchandising and services (Hodgetts & Kuratko, 2001). SMEs in the manufacturing sector convert raw materials into products and sell these products to consumers and/or other businesses. SMEs in the merchandise sector distribute products. Examples include retailers, corner shops, automotive and others dealers. In the third sector, SMEs offer services to other businesses and/or consumers. Examples include hotels and restaurants, barber shops and travel agencies. New business formation rates also vary from one time period to another and depend on geographical location (Storey, 1994). According to the Small Business Service (2005a) the number of SMEs in the UK, for example, increased from 4 million to 4.3 million between 2003 and 2004. Start-up firms in the UK are classified as SMEs that have been trading for less than four years.

The main motives driving the formation of new firms are those of the founder(s) (Bridge, et al., 2003). In the UK for example (Small Business Service, 2005a) the most common reason for setting up a new firm is the founder's desire to be independent and have the freedom of being their own boss. The second common reason is to make money. Small business owners usually make more money running their own firm than working for someone else (Hodgetts & Kuratko, 2001). The remaining key motivators for UK business founders are difficulties in finding other employment and the intention to exploit gaps in the market. Other advantages of going into self-employment besides independence, financial opportunities, employment and opportunity are family employment and challenge (Hodgetts & Kuratko, 2001). Owner-managers have the opportunity to provide family members with employment. 71% of businesses in the UK for example are family-owned. The remaining motivator is that prospective SME

founders may like the challenge that accompanies self-employment and setting-up a business.

While significant advantages are associated with self-employment, there are also numerous potential disadvantages that prospective owners should be aware of. Hodgetts and Kuratko (2001) identify seven key disadvantages of self-employment: sales fluctuations, competition, increased responsibilities, financial losses, employee relations, laws and regulations and the risk of failure. While employees are paid regularly, owner-managers often have to cater for sales fluctuations as sales can be very high or very low during certain time periods. The second disadvantage is the risk of competition for prospective owner-managers: prosperous SMEs may suddenly find themselves under attack from competitors who want to profit as well. Another potential risk is that changes in market demand may bring in large competitors that can force out SMEs. The third disadvantage is increased responsibilities. SME owner-managers often have to combine many qualities – they have to be salesperson, accountant, and personnel manager among others to run the SME successfully. The fourth disadvantage is that SME owner-managers face the risk of financial losses resulting from, for example, bad judgement or wrong decisions. These financial losses have an impact on the owner's income and in the worst case may drive the firm and/or owner into bankruptcy. The fifth disadvantage is that the owner-manager requires human relation skills as he or she is responsible for employee relations and often has to solve employee-related problems. The sixth disadvantage is laws and regulations that the SME owner needs to be aware of and respect such as health and safety regulations and licence laws. These laws and regulations can have financial and other implications for the SME. The remaining disadvantage is the risk of failure that the prospective owner-manager should be aware of. Failure is a characteristic of the SME sector and the closing of SMEs is discussed in more detail at a later stage in this section.

Besides these potential advantages and disadvantages of self-employment, many prospective SME owner-managers frequently experience financial obstacles when starting a new business (Small Business Service, 2005a). Other barriers to setting-up a business include the resource/credibility-merry-go-round issue, high entry barriers, the burden of government bureaucracy and the business plan (Bridge, et al., 2003). The resource/credibility-merry-go-round issue refers to the problem for prospective owners to acquire credibility in order to get the resources necessary to start-up and run the

business. Entry barriers include investment, technology and labour skills required to start the firm; and the availability of niches or growing markets for the SME. Another potential barrier is the burden of government bureaucracy: legal requirements can be costly and time consuming for prospective SME owner-managers. A further crucial hurdle for prospective SME founders is the business plan which is often difficult for them to do because of time constraints and lack of knowledge and understanding.

Whereas many SME owner-managers set-up firms with the intention of expanding it, the majority of firms remain static, often having to focus on survival. The following section discusses these static firms.

### 2.1.4.2 Static - survival

Whilst many owner-managers intend to enlarge their firms, the majority of SMEs do not grow but are forced to focus on survival (Levy & Powell, 2005, Storey, 1994). Two categories of SMEs are commonly classified (Burns, 2001): life style and growth firms. Lifestyle firms are set up to provide the owner-manager with an adequate income whilst enabling the owner-manager to undertake an enjoyable activity. Lifestyle firms are not primarily set up to grow. Growth firms in contrast are set up with the intention of growing and developing the firm in order to make money. Lifestyle firms can make the transition to growth firm whereas it is unlikely that growth firms become lifestyle firms.

Once a business is set-up, many owner-managers discover barriers to survival. These include intense competition, saturated markets, excess capacity and changing technology or product quality (Bridge, et al., 2003). Whereas raising finances to start a firm is often an issue before the firm is set-up, once set-up, SMEs frequently face difficulties with cash-flow (Small Business Service, 2005a). In a study focussing on the first-year following start-up Terpstra and Olson (1993) classify nine common problems: obtaining external finance, internal financial management, sales/marketing, product development, production/operations management, general management, human resource management problems, economic environment and regulatory environment.

The business survival rate in the UK is somewhat better than average. 66% of businesses registered in 1999 were still registered three years later. This is slightly better than Burns' (2001) number of 50% of SME start-ups surviving after three years.

In the US the picture is similar: two-thirds of new employer establishments survive at least two years, and 44% survive at least four years (Small Business Administration, 2005). Business survival rates show the percentage of businesses that are still trading a certain number of years after they first started (Small Business Service, 2005a). Characteristics of the UK SME population include a numerical dominance of firms that are run by the owner (71%) and SMEs with one to nine employees (24%). SMEs in the UK are also mainly managed by men or men in majority. Women SME owner-managers account for 14% with 24% of SMEs being equally managed or owned by men and women. Another characteristic of surviving UK SMEs is that many are relatively young with a substantial proportion trading for less than ten years. For the US, major factors affecting business survival include ample supply of capital, the fact that a firm is large enough to have employees, the owner's education level, and the owner's reason for starting the firm in the first place, such as freedom for family life or wanting to be one's own boss (Small Business Administration, 2005).

Hodgetts and Kuratko (2001) associate four major factors with SME success and as a consequence survival: existence of a business opportunity, management ability, adequate capital and credit, and modern business methods. Successful SMEs, surviving and thriving, have a product or service that customers want to buy and thus exploit a real business opportunity. Management ability refers to the owner-manager of the successful SME who has management know-how. For Hodgetts and Kuratko management ability includes operational, people, machinery, and materials knowledge and people and delegation skills. Adequate capital and credit, the third key success factor, refers to the undercapitalisation that many SMEs suffer from as a result of lack of capital provided when the firm is set-up and poor management of credit lines. Successful SMEs are also aware of the need to update their business methods in order to reduce cost, fight off competition and protect profit margins.

Whereas SMEs set-up for life-style and growth reasons may be static and have to focus on survival at some stage, SME growth, discussed in the next section, is another important phase in SME development.

### 2.1.4.3 Growth

Growth in SMEs can take many forms. Commonly, growth in SMEs is measured in terms of increase in people employed and/or in financial terms like growth in sales, turnover, assets, and trading profit (Barkham, et al., 1996). An example of another type of growth is growth in terms of IS, such as an increase in hardware, software, IT applications, end-user development, number of users and/or type of applications (Cragg & King, 1993).

Growth in SMEs is usually determined by three key variables: (1) the background and resources of the owner(s) such as motivation, education and age; (2) the nature of the firm such as size, sector and location; and (3) strategic decisions taken by the owner-managers of the firm such as the willingness to share ownership and the introduction of new products (Storey, 1994). Younger firms, for example, grow more rapidly than older, more established ones. This finding is applicable to the UK in 2005 as the Small Business Service (2005a) confirms that younger businesses are more likely to envisage growth than older ones.

Growth is often a condition of stress associated with many challenges for SMEs (McMahon, 2001). The ability to deal with these challenges is critical to the development and survival of the SME (Davies, et al., 2002). SMEs commonly experience seven key problems when they grow in terms of volume and scope of operations (Slatter, 1992). The first problem is the inability of the owner-manager to change his or her role. When the SME grows, the role of the owner-manager is changing from one of doing to one of managing and the transition from one to the other is often difficult to make for owner-managers. The second problem is that jobs outgrow people. Employees are often not capable of handling the increasing demands of their jobs that accompany a growing firm. The third issue is communication difficulties. As intra-company relationships increase communication becomes more complex and informal communication is often replaced by formal communication. The fourth problem is the inability to maintain team spirit. Growth often creates tension among employees and/or owner-managers of the SME which has a negative effect on team spirit. Further, the informal structure and culture of the small firm often begins to disappear when the SME is growing which also influences team spirit. The fifth problem is a breakdown in decision making that often occurs as a result of increased volume and speed of decisions required when the SME is growing. The sixth problem is

role confusion as growing number of employees and managers result in confusion about roles and responsibilities and changes in authority. The final problem identified by Slatter is resource shortages. Growing firms tend to, sometimes rapidly, outgrow the infrastructure of the static firm in particular in terms of human capital and systems, which often creates problems. These seven key problems experienced by growing firms commonly result in key people leaving the firm, interdepartmental conflicts, low morale among staff and stress leading to absenteeism, and a focus on short-term operational problems. While the problems identified by Slatter (1992) mainly relate to employees and owner-managers, growth can create other problems for the SME. As SMEs grow, internal financial management problems increase (McMahon, 2001), as do marketing and sales problems (McLarty, 1998).

Yet, whilst SMEs may want to grow there can be barriers that prevent them from doing so. Restricted access to finance (Binks & Ennew, 1996) and availability and cost of finance (Burns, 2001, McMahon, 2001, Storey, 1994) are significant barriers to SME growth. Other barriers include changing market conditions such as increased competition (Burns, 2001) and other industry factors such as level of demand, cost of labour and labour legislation (O'Gorman, 2001).

Research by the Small Business Service (2005a) suggests that many SMEs are content with not having a growth imperative, just as Burns (2001) proposes with his distinction between growth and life-style firms. Most small businesses in the UK either want to grow or do not want to grow. The population is evenly split between SMEs intending to grow and SMEs not intending to grow. The most frequent reason for not intending to grow is that SMEs are happy to remain at their present size. Only a minority of firms is prevented from growing through non-market and market factors.

While growth in terms of employment is regularly receiving attention (Storey, 1994), employment growth among UK SMEs is not common. Where it is experienced, it is usually not sustained for two consecutive years. The most common means of growth among UK SMEs in 2004 was to increase volume of turnover or sales with the existing market/product parameters (Small Business Service, 2005a). UK SMEs achieve sustained growth through exporting, widening markets and product/service portfolios, using external finance, training staff and managers and reducing cost.

Whereas an uncountable number of SMEs are set-up, stay static, fight for survival and grow, many SMEs close every year. The following section discusses SME closure.

### 2.1.4.4 Closure

While many SMEs are created every year, up to 50% of start-up firms cease to exist during the first three years (Burns, 2001). In the US for example about 10% of businesses with employees closed during 2004 (Small Business Administration, 2005). SMEs frequently fail because of two key reasons: external factors beyond the SME's control such as market changes due to recessions; and incompetence of owner(s) who do not know how to run a business and/or lack managerial experience (Hodgetts & Kuratko, 2001). These causes for failure have been known for a very long time, yet they continue to be key causes for SME failure. Bruno et al. (1987) for example identified three major categories of causes for failure back in 1987: product/market problems, financial difficulties and managerial problems. Other, less common, causes associated with SME failure are neglect, fraud and disaster (Hodgetts & Kuratko, 2001). As the owner-manager is a key factor in business failure, Hodgetts and Kuratko (2001) identify three major areas of management traps that lead to SME decline and failure. These are poor financial planning, poor coordination between manufacturing and selling and poor general administration.

Failure is endemic and one of the particular characteristics of the SMEs sector (Storey, 1994) - most SMEs are born to die (Burns, 2001). Yet, failure rates vary according to the characteristics of the firm and those who own it. Storey (1994, p.109), for example, suggests that 'young firms are more likely to fail than old firms; that very small firms are more likely to fail than their larger counterparts; and that for young firms the most powerful influence on their survival is whether or not they grow within a short period after start-up'. Failure rates further depend on sectors with construction and retail, for example, having high failure rates. Thus Storey (1994) considers age and size of the business, past growth and sector to be the key factors influencing the probability of SME failure. Other, less influential, factors include ownership, management, economic conditions, firm type, location, and businesses in receipt of state subsidies.

While many SMEs cease to exist after a certain number of years those that are no longer trading are not necessarily failures. SMEs will close for many different reasons. The

owner for example may retire or the SME may have been taken over by another business. Other reasons for closure include the fact that SMEs may have fully exploited the available market or they may have completed a time-limited task, such as a company formed for a trade fair (Small Business Service, 2005a).

Burns (2001) summarises that there are three sorts of exits for SMEs: (1) to cease to trade where SMEs close without creditors being owed any money; (2) failure where SMEs go into liquidation and owner-managers may declare bankruptcy; and (3) harvest where SMEs are sold on. The most common closure according to Burns is (1) cessation to trade. The 2004 data for the UK confirms Burns classification of SME exit types and verifies the most common reason for closure: 48% of SMEs in the UK closed voluntarily in 2004. Only 5% of SMEs in the UK had to close necessarily in 2004 and thus failed. 29% of SMEs were sold on to another business or individual (Small Business Service, 2005a).

After introducing SMEs in this section, the following sections looks at innovation and IS as ASP is classified as an IS innovation.

## 2.2 Innovation

Over the past decades, interest in the 'successful exploitation of new ideas' (DTI, 2003, p.18) has grown tremendously and is ever increasing (Cobbenhagen, 2000, Rogers, 2003). Innovations matter because they drive economic progress, foster firm survival and growth and provide higher quality goods and services to consumers (DTI, 2003). This section defines innovation, explains core concepts of innovation, and identifies three dominant innovation research clusters. The relevant innovation diffusion cluster is discussed in detail.

### 2.2.1 Innovation definition and types

Innovation evolves around newness and change. The term innovation is derived from the Latin word 'innovare' which means 'to renew, to alter, to make something new' (The Oxford English Dictionary, 1989a, p.997). Innovation encompasses the invention, development, implementation and subsequent spread through economies and societies of new products, services, arrangements and programs. For the purpose of this thesis

innovation is defined as 'an idea, practice, or object that is perceived as new by an individual or other unit of adoption' (Rogers, 2003, p.475). This definition emphasises that the distinguishing characteristic of an innovation is the perception of the adopting unit. An idea, for example, can be an innovation for one unit but not for another. Therefore if an idea, practice or object seems new to the adopting unit, it is an innovation.

Innovations may be entirely new or involve the application of existing ideas that are new to the adopting unit; or they can be a combination of both. Many innovations are incremental because they are successions of individually modest improvements to products or services over their life cycle. Yet, some innovations are dramatic or radical as they can create entirely new industries and markets (DTI, 2003). This generic DTI innovation typology is an excellent holding for the numerous classifications of innovation that have emerged over time. Early contributions include Zaltman et al. (1973) who differentiate innovations according to the state of the system (programmed and non-programmed innovations, according to their degree of anticipation), in terms of their initial focus (product or service innovations, process innovations, technological innovations etc.), and in terms of innovation outcome or effect (radicalness, variations etc.). The most common distinction however remains between radical and incremental innovations (Freeman, 1994) as advocated by the DTI. The DTI typology further caters for the multidisciplinary nature of the innovations discipline: innovation is a subject of study in a wide variety of disciplines.

Innovation is not to be confused with invention. Drawing upon botany, Metcalf (1999, p.55) points out that 'invention is a flower, innovation is a weed' indicating that innovation encompasses not only the new idea, practice or object but also the subsequent spread of the new idea, practice or object through economies and societies. Consequently three dominant innovation research clusters or perspectives have emerged.

### 2.2.2 Innovation perspectives

Innovation has acquired various meanings over time and three dominant innovation research clusters have emerged (Zaltman, et al., 1973). These are 1) the process of developing a new item, 2) the process of adopting a new item and 3) the new item itself.

Each cluster reflects a different innovation perspective: the process of developing a new item (1) refers to the creative process whereby a new idea, practice or object is developed based on research or market demand and resulting in widespread utilisation of the innovation. The second concept, the process of adopting the new item (2), refers to the innovation diffusion process - the process of user acceptance and implementation. The third concept (3) refers to the innovation itself as the outcome of the development process, for example the new or improved product, service, process, management technique or other. Whereas the first two perspectives, termed invention and adoption by Zaltman et al., involve processes the emphasis in the third cluster is on describing why something is novel. A key difference between the process approaches is that an individual or organisation can be innovative without adopting the innovation in the first cluster. In the second cluster the individual or organisation can be innovative without developing or inventing an innovation. The focus of innovation research has over time gradually evolved from the new item (3) to the process of adopting the new item (2) to the process of developing the new item (1) (Cobbenhagen, 2000). Van de Ven et al. (1999) for example conclude that the majority of innovation research focuses on explaining the adoption and implementation of already-developed innovations.

### 2.2.3 Innovation in organisations

Innovation is widely acknowledged to be crucial for organisational competitiveness and effectiveness (Wolfe, 1994). Broadly defined, an organisation is 'an organised structure, body or being, an organism' encompassing the 'action of organising, or condition of being organised as a living being' (The Oxford English Dictionary, 1989b, p.923). In a business context, an organisation is 'a group of people intentionally organised to accomplish an overall, common goal or set of goals' (McNamara, 2005). In an enterprise organisation, for example, the group of people is organised to accomplish profit. SMEs are organisations.

There are five significant types of relationships between innovation and organisations (Davies & Associates, 1986): 1) the organisation as a user of innovation, 2) the organisation as inventor of innovation, 3) the organisation as both user and inventor of innovation, 4) the organisation as vehicle for innovation, and 5) the organisation as innovation. In type 1 an organisation adopts and implements an innovation from outside the organisation. Research concerned with type 1 relationships most often examines

adoption and diffusion of innovations among organisations, investigating for example why organisations adopt innovations or why some organisations are quicker to adopt an innovation than others. In type 2 relationships an organisation creates an innovation for an external market – the innovation is not produced for the organisation but for the market. Research about type 2 relationships frequently investigates innovation development activities of organisations questioning, for example, the differences in the types and quality of innovations produced by a sample of organisations. Type 3 relationships occur when organisations invent and use solutions for specific problems that they experience. Examples include software developed in-house and implemented in response to a specific organisational need. Innovations that stem from type 3 relationships may eventually become type 2 organisation-innovation relationships if there is a market potential for the innovation and the organisation commences to offer the innovation to the market. Type 4 relationships between organisations and innovations apply to cases where organisations act as carrier for the innovation. In type 4 relationships organisations are often created to enable the diffusion of an innovation and an example is a joint venture between organisations created to facilitate the spread of an innovation among an intended audience. In type 5 relationships the organisation is the innovation. An example of type 5 is the virtual organisation, a new form of organisations that emerged in the last decade.

Whilst Zaltman et al. (1973) contribute three generic innovation research perspectives, and Davies & Associates (1986) identify five significant types of relationships between innovation and organisations, Wolfe (1994) clusters innovation research in organisations into three streams: (1) the diffusion of innovation approach, (2) the organisational innovativeness approach and (3) the process theory approach.

The diffusion of innovation approach (1) asks what the pattern of diffusion of an innovation is over time among an organisational population. This approach adopts the innovation as unit of analysis and identifies factors that influence diffusion among organisations and distinguishes characteristics of adopters. The objective of the second approach (2), organisational innovativeness, is to determine an organisations' tendency to innovate. The unit of analysis becomes the organisation. In this stream, the dependent variable, organisational innovativeness, is for example measured by the number of innovations adopted by an organisation. In the third stream (3), process theory models, research investigates the nature of the innovation process in organisations. The unit of

analysis is the innovation process. Two generations of process theory models have emerged: stage model and process model approach. The purpose of the earlier, stage model approach is to identify stages in the innovation process. Second generation research in contrast investigates the process as a whole, identifying the sequence of stages and conditions which determine the innovation process.

In this thesis, Zaltman et al's (1973) second cluster, innovation diffusion, is relevant as the objective is to investigate the diffusion of an innovation (ASP). The diffusion of innovations stream is discussed in the following section.

## 2.3 Diffusion of innovations

'Many technologists believe that advantageous innovations will sell themselves, that the obvious benefits of a new idea will be widely realised by potential adopters, and that the innovation will diffuse rapidly. Seldom is this the case. Most innovations, in fact, diffuse at a disappointingly slow rate, at least in the eyes of the inventors and technologists who create the innovations and promote them to others' (Rogers, 2003, p.7). This section discusses innovation diffusion and innovation processes in organisations.

In the innovation diffusion discipline scholars investigate the spread of innovations through systems over time and across space or in the words of Rogers (p.474), diffusion is 'the process in which an innovation is communicated through certain channels over time among the members of a social system'. Innovation diffusion thus represents the second innovation research cluster identified by Zaltman et al. (1973). Within the cluster, Rogers identifies eight core types of diffusion research and calculates approximate percentage of the total diffusion publications available for each type. The most popular diffusion research type with 58% is to study variables related to individual and organisational innovativeness followed by communication channel use research with 7%. Earliness of knowing about an innovation by the members of a social system research follows with 5% and opinion leadership in diffusing innovations research with 3%. The remaining types are rate of adoption of innovations in different social systems (2%); rate of adoption of different innovations in a social system (1%); diffusion networks (less than 1%); and consequences of an innovation (0.2%). The remaining 22% are other studies.

According to Rogers (2003) the innovation diffusion research perspective emerged from a hybrid corn diffusion study (Ryan & Gross, 1943) in the agriculture discipline that gave rise to an increasing number of diffusion studies across disciplines. For Rogers the roots of diffusion theory can be traced back to the beginning of the 20th century when sociology and anthropology merged into social sciences. The foundations are thinking from German-Austrian and British scholars and the French sociologist Gabriel Tarde (Rogers, 2003). McMaster (2001) additionally accredits a British institution, the Society for Diffusion of Useful Knowledge (SDUK), which convened in 1825.

Whilst diffusion research began as a series of scientific enclaves, it is, like innovation, a multidisciplinary discipline that is being studied in many different scientific disciplines. At the heart of innovation diffusion theory is the notion of innovativeness where individuals are seen as possessing different degrees of willingness to adopt an innovation over time. This leads to five categories of innovation adopters among the members of a social system: innovators, early adopters, early majority, late majority and laggards. Individuals in each category typically possess certain distinguishing characteristics. Innovators for example are venturesome, early adopters are respectful, early majority are deliberate, late majority are sceptical and laggards are traditional (Rogers, 2003). It is generally observed that the bell-shaped adopter category curve results in a diffusion characteristic S-curve shape when the cumulative number of adopters is plotted.

Whilst an innovation may be desirable for one potential adopter it may be undesirable for another potential adopter whose situation differs. Hence, while some innovations diffuse rapidly among the members of certain social systems, they diffuse slowly among the members of another social system. Yet, most inventions never diffuse at all and end up 'on the scrap heap of history' (Franklin, 2003, p.17). Some estimate that around 91% of new product ideas fail either before they get to the market or in the market itself (Booz, et al., 1982). A historical rule of thumb for innovation diffusion is that 'from 100 initial ideas only around 10 will be developed seriously, 2 reach the market leading to 1 commercial success' (Adams & Wallbank, 1986, p.109).

In diffusion research, the adoption and implementation of innovations can be studied at many different levels such as the society, the organisation, or the individual

(Cobbenhagen, 2000). This thesis aims to determine the diffusion of the ASP innovation among SMEs, hence organisational oriented parts of the diffusion literature are appropriate and discussed in the following section.

### 2.3.1 Innovation processes in organisations

Innovation processes are often studied among individuals and organisations. Hence individual oriented models of the innovation process and organisational oriented models of the innovation process have emerged (Zaltman, et al., 1973). As ASP is being studied among SMEs, organisational models of innovation processes are relevant. According to Wolfe (1994) innovation process research in organisations determines the stages and processes involved in organisational innovation.

When looking at the development of innovation research, innovation processes have been a focus of attention for many years. Zaltman et al. summarise early models of the innovation process, differentiating between organisational and individual oriented models. Figure 2 depicts these early organisational models of the innovation process.

| (Milo, 1971) | (Shepard, 1967) | (Hage & Aiken, 1970) |
|---|---|---|
| 1. Conceptualisation<br>2. Tentative adoption<br>3. Resource getting<br>4. Implementation<br>5. Institutionalisation | 1. Idea generation<br>2. Adoption<br>3. Implementation | 1. Evaluation<br>2. Initiation<br>3. Implementation<br>4. Routinization |

| (Wilson, 1966) | (Zaltman, et al., 1973) |
|---|---|
| 1. Conception of the change<br>2. Proposing of change<br>3. Adoption and implementation | 1. Initiation stage<br>- Knowledge-awareness substage<br>- Formation of attitudes toward the innovation substage<br>2. Implementation stage<br>- Initial implementation substage<br>- Continued-sustained implementation substage |

**Figure 2: Organisational oriented models of the innovation process (Zaltman et al., 1973)**

Wolfe (1994) follows on from Zaltman by summarising organisational oriented models of the innovation process published between 1973 and 1990. Wolfe's summary includes organisational innovation process models from Daft (1978), Ettlie (1980), Rogers (1983), Tornatzky et al. (1983), Meyer and Goes (1988), and Cooper and Zmud (1990). Wolfe however distinguishes between two generations of innovation process models:

earlier work which has resulted in various stage models and second generation process models. In first generation or stages research, the core question is 'What are the stages that organisations go through in implementing innovations?' (p.414). For second generation diffusion research in organisations, the core question is 'What factors explain the chain of events which result in innovation implementation?'. The models summarised by Zaltman et al. as well as Zaltman et al's own model fall into the first category of first generation stage models.

Although these first generation innovation process studies vary in terminology and in start and end points, the stages identified follow a general pattern: 'a decision making unit becomes aware of an innovation's existence, a problem or opportunity is matched to the innovation, the innovation's costs and benefits are appraised, sources of support and/or opposition attempt to influence the process, a decision is made to adopt (reject) the innovation, the innovation is implemented, the innovation decision is reviewed and confirmed (reversed), the innovation becomes accepted as routine, and the innovation is infused, i.e. is applied to its fullest potential' (Wolfe, 1994, p.411).

A contemporary stage model of the innovation process in organisations, that depicts Wolfe's general pattern is Rogers (2003) innovation process in organisations (Figure 3). Rogers' (2003) innovation process in organisations identifies the main sequence of decisions, actions, and events that occur over time when an organisation adopts and implements an innovation.

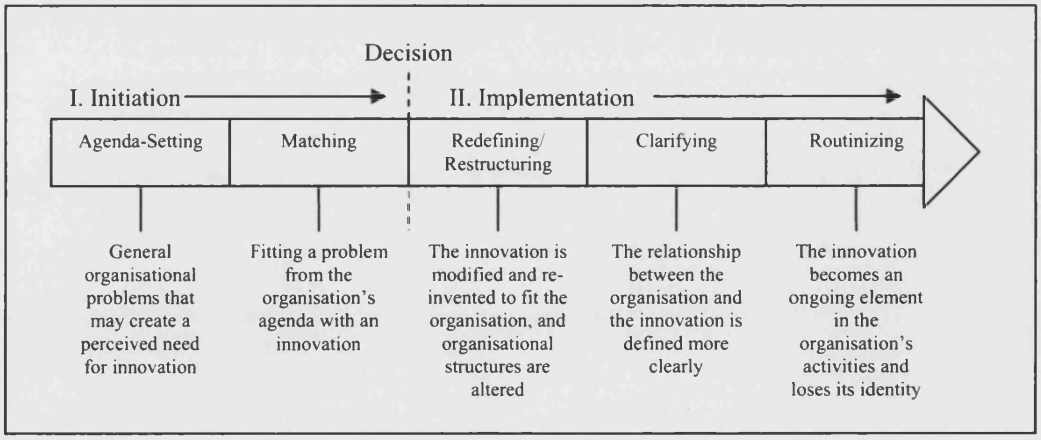


**Figure 3: Innovation processes in organisations (Rogers, 2003)**

Rogers' innovation process in organisations consists of five stages and two sub-processes. The stages in this process are sequential, meaning that later stages cannot be

undertaken until earlier stages are completed. The first sub-process, initiation, contains two stages: agenda-setting and matching. Agenda-setting occurs when the organisation identifies a problem that creates a need for an innovation. This stage initiates the innovation process sequence in organisations. The second stage is called matching. At this stage an organisational problem is matched to an innovation. The initiation sub-process leads up to the decision to adopt an innovation. Adoption has traditionally been a central event in innovation studies (Wolfe, 1994). The second sub-process, implementation, consists of the stages redefining/restructuring, clarifying and routinizing. At the redefining/restructuring stage an innovation, imported from outside the organisation, is altered to fit the organisation. The organisational structure is changing as well to accommodate the innovation. At the clarifying stage the innovation is put into widespread use, clarifying the relationship between the organisation and the innovation. The final stage in the innovation process sequence is routinizing, which occurs when the innovation becomes part of an organisation and loses its separate identity.

The key limitation of these first generation innovation process studies is that complex innovations and innovations originating within the adopting organisation cannot accurately be presented in simple, sequential stage models (Schroeder, et al., 1989). This key limitation fosters second generation process research that aims to address this shortcoming by adopting the entire innovation process as a unit of analysis. Yet, ASP, the innovation studied in this thesis, does not originate within the adopting organisation (SME). The innovation-organisation relationship (Davies & Associates, 1986) is of type 1 where the organisation is the user of the innovation. Hence a first generation diffusion research approach in organisations (Wolfe, 1994) appears suitable for the purposes of this study.

### 2.3.2 Critiques of innovation diffusion theory

Whilst diffusion of innovations theory offers many useful insights and understandings it is not without limitations. Larsen (2001, p.36), for example, argues that in Rogers diffusion theory 'the scope is too narrow, the actual observed richness of human behaviour is not taken into account and the theory's specification of diffusion decisions, when compared to real organisational diffusion management, render us with more questions asked than answered'. Diffusion theory is further heavily pro-innovation and

individual biased (Larsen, 2001): diffusion of innovation theory emphasises that individuals make innovation adoption decisions, yet, in an organisational context employees usually are not in the position to make innovation decisions. This individual bias of diffusion of innovations theory is also a critique advocated by Fichman (2004) who presents four main reasons why Rogers' theory does not have high explanatory power in organisational settings for IS/IT innovations. As ASP is an IS innovation, these shortcomings need to be acknowledged. The first shortcoming, according to Fichman, is that organisational IS/IT innovations are more complex than Rogers' diffusion theory specifies. IS/IT innovations processes unfolding are richer and more diverse for the adopting organisation than advocated by Rogers. The remaining shortcomings are that decisions are overwhelmingly organisational and not those of individual users; and that the categories of early adopters, early majority, late majority and laggards are unproven.

As these are core problems related to diffusion research it is necessary to identify relevant aspects of diffusion theory when undertaking diffusion research (Larsen, 2001).

### 2.3.2.1 Shortcomings of innovation process stage models

A significant shortcoming of innovation process stage models relates to the consequences of innovations for organisations. Innovation process in organisations theories terminate with application of the innovation to its fullest potential but do not consider the effects that result for organisations from the adoption and implementation of the innovation. In fact, only 0.2% of generalisations of innovation diffusion studies are about consequences of innovations (Rogers, 2003). Consequences are 'the changes that occur to an individual or a social system as a result of the adoption or rejection of an innovation' (p.436). Innovations can have a wide range of consequences for organisations. The diffusion discipline for example classifies desirable and undesirable, direct and indirect, and anticipated and unanticipated consequences (Rogers, 2003). Desirable and undesirable consequences refer to the functional and dysfunctional effects an innovation may have to an individual or a social system. Most innovations have both desirable and undesirable outcomes that cannot be separated from each other. Direct consequences are the 'changes to an individual or a social system that occur in immediate response to adoption of an innovation'; indirect consequences are the 'changes to an individual or a social system that occur as a result of the direct

consequences of an innovation' (p.445/446). Indirect consequences of innovations are often difficult to grasp and unanticipated. Unanticipated consequences are 'changes due to an innovation that are neither intended nor recognised by the members of a social system' (p.448). In contrast, anticipated consequences are readily apparent with intended and recognised changes occurring. The applicability of these three dimensions of consequences to organisations is not widely understood.

Whilst there are some significant shortcomings, diffusion of innovations theory is well established and widely used in information technology diffusion-related research (Mustonen-Ollila & Lyytinen, 2003). The perspectives of Rogers particularly dominate research on the diffusion of IS (Newell, et al., 2000). ASP, the innovation studied in this thesis, is an IS innovation hence innovation diffusion theory and Rogers' perspectives are suitable for studying the diffusion of ASP. Yet, before discussing ASP in detail, IS are introduced in the following section.

## 2.4 Information systems

Most contemporary organisations rely on information systems as information is a key resource in the information age (Haag, et al., 2004). IS comprise of the two elements information and system. Information is data, a collection of raw facts or observations that has been transformed into a form meaningful and useful to human beings. A system is a set of interdependent components which exist for a purpose. The components that make up a generic system are: input, which is transformed in a process into output. The combination of these two elements, an information system, is a set of interrelated components designed to input data which is transformed into information that can be used to support the activities of human beings (Beynon-Davis, 2002, Bocij, et al., 1999, Laudon & Laudon, 2000).

The terms information system and information technology are often used interchangeably which is a mistake (Bocij, et al., 1999). Information technology is any computer-based tool that people use to work with information and data (Haag, et al., 2004). In a computerised information system, for example, people use information technology to transform data into information and electronically transmit data and information to the intended audiences.

This section describes information system types with a focus on computerised IS. A sub-section discusses the internet. The subsequent sections review information systems in organisations and IS positioning in organisations.

### 2.4.1 Types of information systems

Information systems can take many forms. The most common types are human, paper-based and computer-based IS (Boddy, et al., 2002). Human IS are informal and involve thinking. In a human IS a person processes data and produces information usually in a thought process. The second common type is an IS based on paper. Paper is still used widely to record and process data with the aim of transforming the data into information. Many information systems however are computerised. The key technology elements of computer-based IS are hardware, software, telecommunications and networks (Boddy, et al., 2002). Hardware refers to the physical components of the computer-based information system. Hardware usually falls into one of six categories: input devices, output devices, storage devices, central processing unit (CPU), random access memory (RAM), and communication and connecting devices (Haag, et al., 2004). Input devices are tools that enable data and information capture and commands. Examples of input devices include keyboard, mouse, touch screen and barcode reader. Output devices are components that enable people to see, hear, or otherwise recognise data and information. Examples of popular output devices include printers, monitors and speakers. Storage devices are tools used to store data and information. An example of an internal storage device is the computer's hard disk. CDs, DVDs and memory sticks are examples of external storage devices. The central processing unit (CPU) 'interprets and executes the software instructions and coordinates how all the other hardware devices work together' (p.19). Common CPUs include Intel Pentium and AMD processors. Random access memory (RAM) is temporary storage for information and software that is in use. A communication device is a tool that enables the sending and receiving of data and information. Communication devices make communication from one location and person to another location or person possible. Examples of communication devices include modems and satellite. Connecting devices are tools that link devices to each other such as a cable connecting a computer to a printer.

Whereas hardware comprises of the physical components of a computerised IS, software 'is a set of instructions written in a specialised language which controls the

operation of the computer' (Boddy, et al., 2002, p.10). Two main types of software are commonly differentiated: system software and application software (Boddy, et al., 2002, Haag, et al., 2004). System software manages and controls the resources of a computer. There are two sub-categories of system software, operating software and utility software. Operating software such as Windows, UNIX and Linux control the application software and manage the hardware devices. Utility software adds additional functionality to the operating system. An example of utility software is antivirus software which scans storage devices and RAM for viruses and eliminates viruses if found. Application software enables the user of the computer to carry out specific tasks. Application software is commonly categorised as personal productivity software and horizontal and vertical market software (Haag, et al., 2004). Personal productivity software enables the computer user to perform personal tasks. Examples of personal productivity software include word processing software such as Microsoft Word and picture editing software such as CorelDraw. Vertical market software is written for a specific industry and is therefore unique to this particular industry. A good example of vertical market software is software for the health care industry such as patient scheduling applications. Horizontal market software is suitable for a variety of industries as functions are very similar. Examples of horizontal market software include accounting packages offered by firms such as Sage and payroll and invoice processing software.

The remaining elements of computerised information systems are telecommunications and networks. Whereas communication devices such as modems fall into the hardware category, the telecommunication element of an information system refers to the method of electronic data and information transmission between different locations. When computers are linked electronically for the purpose of data and information transmission networks are created. These networks can focus on specific locations such as local area networks (LANs); or they can be wide area networks (WANs) that cover large areas. The internet is a well-known example of a computer network. Yet, the internet is a global network that connects millions of people all over the world. As networks and the internet are key elements of the application service provision (ASP) innovation, the following sub-section discusses the internet.

#### 2.4.1.1 The internet

The internet, 'a vast network of computers that connects millions of people all over the world' (Haag, et al., 2004, p.108), is increasingly and significantly affecting society. To connect to the internet telecommunications and communication hardware devices are essential. Telecommunications is commonly supplied by internet service providers (ISPs). ISPs are companies that specialise in providing access to the internet. Communication devices needed to connect include hardware such as telephone and digital subscriber line (DSL) modems. Whereas telephone modems connect to the internet via a telephone line, DSL modems are dedicated high-speed internet connections. To access information on the internet, specific software is needed. First, there is connectivity software that enables a computer to connect to a network or another computer. Then there is web browser software such as Internet Explorer and Firefox that enables the user to surf the internet. Finally, there is internet communication software that enables the user to communicate electronically via the internet (Haag, et al., 2004).

The internet is a great source of information and services. Commonly an internet user accesses websites to gather information or get access to services. A website is a specific location on the internet that consists of many web pages which deal with specific topics. One type of service enabled by the internet is having an ever increasing impact on organisations and consumers alike: electronic commerce or short e-commerce which refers to the process of buying and selling goods and services over the internet (Haag, et al., 2004). Four types of e-commerce are commonly distinguished: business-to-business (B2B), business-to-consumer (B2C), consumer-to-consumer (C2C) and consumer-to-business (C2B); and government commerce complements these four types. In B2C e-commerce, businesses sell products and services directly to consumers over the internet. Famous examples of businesses selling to consumers directly are amazon.com for books and britishairways.com for air travel tickets. In B2B e-commerce businesses buy and sell from and to each other. In B2C e-commerce consumers sell to and buy from other consumers. Prominent examples are internet auction sites such as EBay that enable consumers to market their products or services to other consumers or buy products and services from other consumers. The fourth type is C2B e-commerce where many consumers band together to buy from a business with the aim to obtain volume discounts. Of these four types, B2B e-commerce is the most significant one as it accounts for around 85-90% of the money spent (Haag, et al., 2004). E-government

complements the four types of business and consumer e-commerce. E-government refers to the application of e-commerce technologies by government agencies. Government agencies do buy products and services using internet technologies from suppliers and they do offer services, information and goods to citizens over the internet.

Besides e-commerce, communication over the internet is increasingly gaining significance. E-mail is probably the best known form of communication over the internet (Bocij, et al., 1999). Chat rooms and forums are other forms of communication made possible by the internet. Recent internet communication trends include verbal communication transmitted via the internet (VoIP).

The internet clearly has significant effects on many aspects of society: it offers countless opportunities for organisations, it has great benefits for consumers and it enables governments to better serve their citizens. The dot.com entrepreneurial frenzy that began in the 90s and ended in turmoil in the early years of the new millennium has even created an entire new industry. The internet, however, also has negative aspects: as a global network it exposes users and their computers to security threats. A whole new discipline of internet instigated crime has developed: cyber crime. Popular cyber crimes include breaking into someone's computer to steal data and information. Stealing sensitive data such as credit card numbers and business espionage are common cyber crimes. A renowned threat comes from hackers. Hackers are very computer knowledgeable people that use their knowledge to invade other people's computers (Haag, et al., 2004). Another serious form of cyber crime is computer viruses which is software written to cause annoyance and damage. Viruses, spread over the internet through for example e-mail communication, can infect a computer causing many problems. To protect computers, information and data from internet threats, various hardware and software is available. Anti-virus software for example offers protection from viruses; firewalls protect computers and network from intruders; and access authentication control access to networks and computers. Cyber crime is 'big business' with security software generating revenue worth billions of dollars every year (Haag, et al., 2004).

### 2.4.2 Information systems in organisations

In this thesis, the term IS refers to computerised information systems that create information for organisations and the human beings working for these organisations. Information systems can support organisations in many ways and two categories of IS are typically distinguished: operations IS that support an organisation's business activities and management IS that support managerial decision making (Bocij, et al., 1999). Operations IS are concerned with 'process control, transaction processing, communication (internal and external) and productivity'. Management IS 'provide feedback on organisational activities and help support managerial decision making' (p.31). Examples of operations IS include a) process control systems often used in manufacturing, for example, to control stock levels and automatic ordering of raw materials when necessary; b) transaction processing systems such as cash withdrawal machines from banks that process data about cash withdrawals on the spot; and c) office automation systems that are concerned with improving efficiency, enhancing communications and increasing productivity by applying IS to automate tasks common in the offices of organisations. Examples of management IS include a) information reporting systems that produce reports containing information that supports the decision maker; b) decision support systems that provide information to decision makers with the aim of supporting decision making; and c) executive information systems that senior managers use to select, retrieve and manage information with the underlying aim of achieving the organisation's business objectives.

### 2.4.3 Information systems positioning in organisations

Information system can be positioned in various ways in organisations. The position needs to fit the culture or structure of the organisation otherwise it will cause tension. Boddy et al. (2002) identify four generic forms of positioning IS activities in organisations: to have a central IS unit, to have IS as part of a functional department, to decentralise IS and to federalise IS activities. To have IS as part of a functional department, such as the finance department, was often done in the early days of computing. This approach is suitable when interest and use of IS lie mainly within this department. Problems usually begin to arise when IS activities span across departments and other departments depend more and more on the resources, willingness and ability of the hosting department. In the second position, the organisation has a central IS unit that is responsible for most computing activities. This unit acts as provider of

computing services to the various departments of the organisation. When IS are decentralised in organisations, the various departments are responsible for, and in control of, their respective IS. In the federalised form, the organisation chooses to centralise certain IS activities. Additionally, the various units of the organisation have the freedom to develop and manage their own IS within corporate guidelines. These four forms identified by Boddy et al. are generic and organisations often combine the methods of positioning and move from one form to another. Increasingly however, IS are sourced from external IS providers. These external providers supply organisations with many different kinds of IS and IS services.

## 2.5 Information system innovations

This section combines the first two elements discussed in the review: innovation and information systems by looking at information system innovations. IS innovations are novel organisational applications of digital computer and information communication technologies (Lyytinen & Rose, 2003, Swanson, 1994). Many IS innovations have been introduced in the past and most of the new ideas whose diffusion has been analysed are technological innovations which consist of both hardware and software (Rogers, 2003). This section presents an IS innovation typology and reviews IS/IT innovation diffusion research. The section concludes with a discussion about internet-induced IS innovations.

### 2.5.1 IS innovation typology

Unlike IT innovations which focus on technical aspects and tools, IS innovations 'involve both a technological component (hardware and software) and an organisational dimension captured by such features as new forms of work, business processes or organisation methods' (Lyytinen & Rose, 2003, p.307).

IS innovations usually fall into one of three categories (Swanson, 1994). Type 1 innovations are process innovations restricted to the functional IS core. These innovations can be either a new IS administrative arrangement (type 1a) or an innovation that focuses on the technical IS task (type 1b). IS outsourcing is an example of a type 1a IS innovation and computer-aided software engineering (CASE) is an example of a type 1b IS innovation (Grover, et al., 1997). Type 2 IS innovations extend

beyond the confines of the IS function to involve the application of IS products and services to the administrative core of the organisation. Examples of type 2 IS innovations include e-mail and executive information systems (Grover, et al., 1997). Type 3 IS innovations integrate IS products and services with core business technology. Type 3 IS innovations can be subdivided into three categories: type 3a innovations which centre on the firm's core work processes; type 3b innovations which extend to basic business products and services; and type 3c innovations where the IS innovation provides for the integration or coordination with the suppliers, distributors or customers of the organisation. An example of a 3a type IS innovation is CAD/CAM and an example of a 3c innovation is EDI (Grover, et al., 1997). An inter-organisational system with customers, as used in the airline industry, is an example of a type 3b IS innovation (Swanson, 1994).

### 2.5.2 Diffusion of IS innovations

Few empirical studies exist which examine how IS innovations come to be adopted and diffused across organisations (Currie, 2004a). This fundamental lack of research on IS innovations in organisations in the innovation discipline has first been identified by Swanson (1994). To date, research on IS innovations in organisations remains isolated and fragmented as studies typically examine single innovations and do generalise little to notions about IS innovations (Grover, et al., 1997, Mustonen-Ollila & Lyytinen, 2003, Swanson, 1994).

Core contributions on IS/IT innovation diffusion include Cooper and Zmud (1990), who study the material requirements planning (MRP) innovation and Brancheau & Wetherbe (1990) who look at spreadsheet software innovations. Whereas Brancheau and Wetherbe (1990) focus solely on the adoption of an innovation in an organisational context, Cooper and Zmud (1990) present a model of the IT innovation implementation process for organisations. This model is presented in Figure 4.

**Stage 1: Initiation**
Process: active and/or passive scanning of organisational problems/opportunities and IT solutions are undertaken. Pressure to change evolves from either organisational need (pull), technological innovation (push) or both
Product: a match is found between an IT solution and its application in the organisation
**Stage 2: Adoption**
Process: rational and political negotiations ensue to get organisational backing for implementation of the IT application
Product: a decision is reached to invest resources necessary to accommodate the implementation effort
**Stage 3: Adaptation**
Process: The IT application is developed, installed and maintained. Organisational procedures are revised and developed. Organisational members are trained both in the new procedures and in the IT application
Product: The IT application is available for use in the organisation
**Stage 4: Acceptance**
Process: Organisational members are induced to commit to IT application usage
Product: The IT application is employed in organisational work
**Stage 5: Routinization**
Process: usage of the IT application is encouraged as a normal activity
Product: the organisation's governance systems are adjusted to account for the IT application; the IT application is no longer perceived as something out of the ordinary
**Stage 6: Infusion**
Process: increased organisational effectiveness is obtained by using the IT application in a more comprehensive and integrated manner to support higher level aspects of organisational work
Product: the IT application is used within the organisation to its fullest potential

**Figure 4: Six stages of the IT innovation implementation process (Cooper and Zmud, 1990)**

Cooper and Zmud summarise that the IT implementation process in organisations consists of six stages. The authors present a process and a product for each stage. Cooper and Zmud's model follows the general patterns of the stages of organisational models of innovation processes identified in section 2.2.5. Yet, Cooper and Zmud address one significant shortcoming of innovation process models: their model incorporates an infusion stage and thus includes innovation consequences.

Two other core contributions on IS/IT innovation diffusion include Moore & Benbasat (1991) who investigate personal work stations and Premkumar et al. (1994) who study electronic data interchange (EDI). Whereas Moore & Benbasat (1991) study potential adopters perceptions' of the innovation by way of perceived innovation characteristics, Premkumar et al. (1994) examine relationships between certain innovation characteristics and specific diffusion stages. The two remaining key contributions are Hu et al. (1997) and Loh and Venkatraman (1992) who both investigate innovative outsourcing practices. Both studies focus on the adoption of the innovation. Only one study (Cooper & Zmud, 1990) generalises to notions about IS innovation diffusion by presenting a model of the IT diffusion process. One study (Premkumar, et al., 1994)

examines relationships between certain innovation characteristics and specific diffusion stages and four studies (Brancheau & Wetherbe, 1990, Hu, et al., 1997, Loh & Venkatraman, 1992, Moore & Benbasat, 1991) focus solely on the adoption stage. Thus research on IS/IT innovation diffusion in organisations is scarce and whilst much more research is needed on the diffusion of IS/IT innovations, innovation diffusion theory is a solid basis for researching the diffusion of IS and IT innovation (Brancheau & Wetherbe, 1990).

The above studies investigate IS innovations that emerged prior to the widespread diffusion of the internet. The internet, discussed in section 2.2.1, has resulted in countless IS and IT innovations and is continuing to do so. Internet-induced IS innovations are discussed in the following sub-section.

### 2.5.3 Internet-induced IS innovations

The internet is not only widely referred to as an innovation of outstanding importance (Charlton, et al., 1997), it has also resulted in an influx of IS innovations spurred by the evolution of the internet and internet-based technologies (Lyytinen & Rose, 2003). Schumpeter (1934), who is widely regarded as one of the fathers of innovation (particularly in terms of innovation and SMEs), proposed that an economy is continuously being disrupted by technological innovations and the consequences thereof. The current wave of disruptive innovations, based upon digital networks, software and new media that produces internet-induced IS innovations, started in the 1980s (Burns, 2001). The radical nature of this influx of internet-induced innovations causes profound changes in the organisational context: many emerging internet-induced innovations diminish and replace existing forms of IS in organisations (Lyytinen & Rose, 2003); and the internet and internet-induced innovations such as e-commerce have created entirely new industries. E-commerce and e-business are just two examples of significant internet-induced IS innovations that are increasingly being studied by the academic community. ASP, which is discussed in the next section is such an internet-induced IS innovation.

## 2.6 ASP

ASP is an innovation that stems from the diffusion and development of internet technologies (iT2, 2002) and web-enabled solutions (Cherry Tree & Co., 1999). Accordingly, ASP is an internet-induced IS innovation. This section defines ASP, identifies ASP characteristics, and maps ASP development.

### 2.6.1 Definition

ASP facilitates the rental of application software. As identified in section 2.3.1, application software enables the user of a computer to carry out specific tasks. Examples of application software (Haag, et al., 2004) include personal productivity software (such as Microsoft Word and Outlook) and horizontal (such as accounting and human resources applications) and vertical market software (such as patient scheduling applications). The new aspect that classifies ASP as an innovation is the delivery mechanism: ASP is delivered over the internet, a vast network of IS. As the applications delivered are computer applications and the network is the internet, ASP classifies as internet-induced IS innovation.

Whilst there is no uniformly accepted definition of an ASP, the definition from the ASP Industry Consortium is often recognised: 'an ASP manages and delivers application capabilities to multiple entities from a data centre across a wide area network' (ASP Industry Consortium, 2001). The basic ASP concept consists of two features: the back-end concerned with the ASP provider and the enablement of the service, and the front-end concerned with the provider-client element. Core to the ASP concept is that a provider offers a set of applications to a client via a network. In most cases the network is the internet. The applications offered may have been developed or bought by the provider or a combination of both. The provider also hosts and maintains the solution. The client accesses the applications over the network and pays for the service on a rental basis. Figure 5 illustrates these basic elements of the ASP concept.

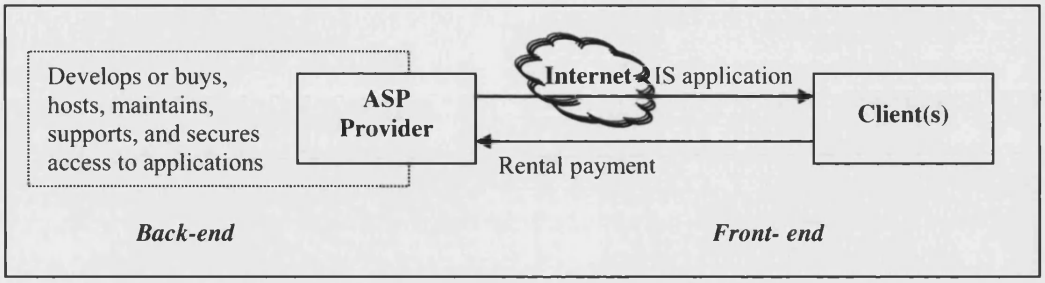


**Figure 5: Basic ASP model**

Early research about ASP (Currie & Seltsikas, 2000, Currie & Seltsikas, 2001, Turner, 2000) concentrates on the back-end and the ASP provider in particular and continues to do so (Brown & Lockett, 2004, Currie, 2004b, Kern, et al., 2002a, Ma, et al., Forthcoming). Front-end research about ASP is emerging (Currie, 2003, 2004a, Susarla, et al., 2003) but empirical evidence from SME ASP clients is scarce. While ASP is an IS innovation targeted at SMEs (Currie & Seltsikas, 2001, Dewire, 2000, Kern, et al., 2002a), knowledge about ASP stems mainly from theoretical contributions and empirical evidence from ASP providers and large ASP customers. In-depth understanding about ASP in SMEs is needed. Chapter three discusses current contributions on ASP in SMEs in detail.

### 2.6.2 Characteristics

Whilst ASP is inspired from traditional IS outsourcing (Kern, et al., 2002a, Tebboune, 2003), it is an IS innovation because it is significantly different from traditional IS outsourcing and other existing IS practices. Several key characteristics differentiate ASP from IS outsourcing. The most determining characteristic that exemplifies ASP as an innovation, is the mode of delivery which is over a network. A second key characteristic is the target audience: ASP is targeted at SME organisations whereas IS outsourcing practices traditionally have been adopted by large organisations. A third characteristic is the service method: whereas an ASP provider offers the same application to many different clients, outsourcing is based on a unique, one-to-one relationship between the provider and the client. Other distinguishing characteristics relate to the contract between the provider and the client. ASP contracts are service level agreements (SLAs) that are flexible over a period of time usually between 12 and 24 months. Outsourcing contracts are usually long term and various contract forms are available. Other differences between IS outsourcing and ASP relate to ownership, location and access to applications and assets. Whereas ASP applications are owned by

the provider and located with the provider, outsourced IS can be owned by the provider, the client or both, and can be located with the provider, client or both. Access to ASP applications is over a network whereas access to outsourced IS applications is through the provider and can be in a written, personal or oral form. There is a further difference in costing. ASP clients usually reimburse the provider for their services with a monthly rental payment that is calculated per use or per user. In contrast, IS outsourcing clients pay a fixed price for the service. Whereas ASP focuses on a specific application and its deployment to the clients, IS outsourcing concentrates on various attributes like business processes and management of networks. The remaining two characteristics, support and maintenance, and upgrades, highlight further differences: maintenance, support and upgrades are part of an ASP contract whereas they are not for IS outsourcing, where maintenance, support and upgrades are additional, often costly features.

Diffusion of an innovation is determined to some degree by the characteristics of the innovation. Although to date ASP has not been evaluated in terms of its innovation characteristics (such as relative advantage, compatibility et al.), the revolutionary exploitation of the internet as a medium for solution delivery and access classifies ASP as an internet-induced IS innovation (Currie, 2004a, Tebboune, 2003). Much of this lack of understanding of ASP characteristics is attributed to the application of outsourcing theories for studying ASP. Although ASP embodies features of traditional IS outsourcing, outsourcing perspectives often have significant shortcomings when applied to ASP (Jayatilaka, et al., 2003). The other issue about applying outsourcing perspectives is that the ASP concept is targeted at SMEs (Currie & Seltsikas, 2001, Dewire, 2000, Kern, et al., 2002a) but IS outsourcing theories neglect the SME context. Innovation diffusion on the other hand offers a promising route for understanding ASP in SMEs.

### 2.6.3 Development

ASP solutions have been available for approximately six years, but ASP adoption rates among SMEs are low (Currie, 2003, Johansson, 2004) and ASP providers have failed to attract a large client base (Susarla, et al., 2003). Much of the lack of ASP diffusion in the marketplace is attributed to the ASP business model which is considered immature (Currie, 2004b). The major impediment is that providers tend to develop technical

solutions without understanding the business and technology requirements of their customers. Early ASP providers, in particular, did not understand important SME requirements and the solutions offered were unsuitable for the markets targeted (Currie, 2003, 2004b). Another impediment to the diffusion of ASP is the lack of 'reputational effects' (Currie, 2004a): the absence of ASP adopters, that can be used as customer reference sites, inhibits diffusion. Hence, there is a lack of best practice and a lack of understanding of the real benefits of ASP for SMEs.

ASP is commonly considered here to stay (Johansson, 2004) with this mode of IS provision likely to become more widespread among SMEs (Brown, et al., 2005). Reduced network cost, increasing supply and capability of communication bandwidth, advances in internet security, and increasing acceptability of browsers as graphical user interfaces, foster the diffusion of ASP (Cherry Tree & Co., 1999, Dewire, 2000, Susarla, et al., 2003). A likely explanation for the slow diffusion of ASP to date, is that the adoption of IT innovations is often slow and painful (Lyytinen & Damsgaard, 2001) and that obviously beneficial technology innovations are not necessarily adopted rapidly (Rogers, 2003). This notion further underlines the applicability of innovation perspectives for studying ASP.

## 2.7 Chapter summary

This chapter reviews the relevant literature elements in the fields of SMEs, innovation diffusion, IS and ASP. The review suggests that research on the diffusion of IS innovations in organisations is scarce and that the emerging ASP innovation warrants investigation. The review also suggests that, unlike outsourcing theories, innovation diffusion theory is a solid basis for researching the diffusion of IS innovations. The chapter identifies a contemporary model of the innovation process in organisations (Rogers, 2003) that can be employed for the purposes of the research.

To minimise ambiguity, address the complex, context-sensitive nature of innovation research (Wolfe, 1994) and tackle the shortcomings of diffusion theory (Larsen, 2001) this chapter further identifies the relevant aspects of diffusion theory. The perspective is innovation diffusion (Zaltman, et al., 1973). Within this cluster, organisational models of the innovation process (Wolfe, 1994) are applicable and Rogers' (2003) model of the innovation process in organisations is suitable as it incorporates the key stages of the

process. All the stages of the innovation process in organisations, from adoption to implementation and consequences, are relevant. The types of organisations included in the study are SMEs. The chapter concludes with the attributes of ASP, the innovation whose diffusion is investigated.

Chapter two supplies the basic understanding for chapter three which reviews innovation, IS and ASP in SMEs.

# 3 CHAPTER THREE: INNOVATION, IS AND ASP IN SMES

Whereas chapter two, the first major part of the literature review, supplies understanding of the key elements of the research, this chapter focuses on the SME context. It begins by looking at innovation in SMEs (3.1), followed by IS in SMEs (3.2) and concluding with ASP in SMEs (3.3). Chapter three further proposes a conceptual framework (3.4) to address the scarcity of empirical evidence about ASP and the diffusion process in SMEs. The review of the literature presented in this chapter uncovers that scarcity of empirical evidence.

## 3.1 Innovation in SMEs

SMEs are generally subject to many pressures for change. As innovations positively impact the performance of firms (Deakins & Freel, 2003) innovation is crucial for growth (Burns, 2001) and successful development (Carrier, 1995) of SMEs.

Innovation and innovative behaviour is a key differentiator between SMEs and large firms (Storey, 1994). SMEs for example can be more innovative than large firms because they are less bound by bureaucracy and cumbersome organisational systems. Whereas large firms are more likely to undertake research and development and have staff dedicated to research and development, SMEs are very good at providing incremental innovations: SMEs frequently provide something marginally different, often as a reaction to competition (Burns, 2001). In the UK for example, 35% of SMEs with employees had introduced some kind of new product or service and 25% of SMEs had introduced a new process or way of working (Small Business Service, 2005a). Thus niche markets emerge where SMEs provide marginally different products or services (Burns, 2001).

Whilst most innovations in SMEs are variations on known themes (Cobbenhagen, 2000), SMEs can play a critical role in the introduction of radical innovations. Data from the US shows that SMEs produce thirteen to fourteen times more patents per employee than large patenting firms. These patents are twice as likely as large firm patents to be among the one percent most cited (Small Business Administration, 2005). Yet, the role that SMEs can play in terms of radical innovations not only depends

significantly on business activity, industry, the nature of the innovation and the type of company, it also depends on prerequisites such as resources and barriers to entry which can inhibit innovative activities in SMEs (Burns, 2001). Acs and Audretsch (1987), for example, note that SMEs are particularly innovative in industries that are in the early stages of their life cycle; and Deakins and Freel (2003) point out that innovative activities in SMEs are particularly restrained by resource constraints.

Yet, whilst SMEs are generally regarded as being very innovative, research on innovation in SMEs focuses on investigating innovativeness of small high-tech start-ups, often in specific sectors such as manufacturing or biotechnology (Cobbenhagen, 2000). Research about diffusion of innovations among SMEs is less common. As ASP is an IS innovation, the following sub-section reviews studies on the diffusion of IS innovations in SMEs.

### 3.1.1 Diffusion of IS innovations among SMEs

This section reviews literature on the diffusion of innovations among SMEs. As diffusion is primarily concerned with the innovation process, the section reviews IS innovation adoption, implementation and consequences for SMEs. This approach to investigating the diffusion of IS innovations among SMEs is valuable. Sillince et al. (1998), for example, use this approach to investigate the diffusion of e-mail among SMEs. They investigate reasons for adopting e-mail, use and criticism of e-mail and impact of e-mail on the firm and the individuals working for the firm. Panizzolo (1998) similarly investigates reasons for, and obstacles to, adopting an IS innovation, examines critical factors in the implementation of the innovation and describes benefits and degree of satisfaction with the innovation. The innovation that Panizzolo uses as a lens for investigating innovation diffusion in SMEs is CAD-CAM. Panizzolo finds that perceived advantages, internal constraints and external context are the main variables that explain adoption, implementation and consequences of CAD-CAM among SMEs. Two other studies investigate the diffusion of a specific IS innovation, e-commerce, among SMEs: Kendall et al. (2001) and Santarelli and D'Altri (2003). The findings of Santarelli and D'Altri (2003) are only partially applicable in the sense that findings are restricted to problems faced when implementing the innovation and main advantages obtained. Thus Santarelli and D'Altri supply understanding of potential implementation problems and desired consequences for IS innovations. Kendall et al. (2001) on the

other hand use Rogers' five innovation characteristics (relative advantage, compatibility, complexity, trialability and observability) to evaluate potential adoption of e-commerce among SME. Kendall et al. show that only relative advantage, compatibility, and trialability are significant innovation attributes affecting the adoption of e-commerce among SMEs.

Whilst the aforementioned authors investigate the diffusion of certain IS innovations among SMEs, they do not provide generalisations about IS innovations in SMEs. Thong (1999) in contrast, investigates contextual variables that determine SMEs' adoption of IS innovation. He finds that CEO characteristics, innovation characteristics, and organisational characteristics determine the adoption of IS in SMEs. The environmental characteristic competition does not influence adoption. Yet, Thong only looks at the adoption phase of the diffusion process. Premkumar (2003) includes adoption and implementation phases in the study of computer mediated communication technology innovations. He finds that competitive advantage, management support and SME size critically influence the adoption of computer mediated communication technology innovations. To the surprise of the author, cost is not a major adoption driver. Top management support further is identified as a critical factor during the implementation phase. Thus no generalisations about IS innovation consequences for SMEs are available. The following Table 1 summarises the aforementioned contributions on IS innovation diffusion in SMEs.

| *Reference* | *Innovation* | *Diffusion phases studied* | *Findings* |
|---|---|---|---|
| Sillince, et al. (1998) | e-mail | Adoption, implementation, consequences | Identify reasons for e-mail adoption, use of e-mail in SMEs, criticism of e-mail and impact of e-mail on firm and employees |
| Kendall, et al. (2001) | e-commerce | Adoption | Use Rogers' 5 attributes of innovations and measure their influence on adoption. Only relative advantage, compatibility, and trialability are significant innovation attributes affecting the adoption of e-commerce among SMEs. |
| Panizzolo (1998) | CAD-CAM | Adoption, implementation, consequences | Perceived advantages, internal constraints and external context are main variables that explain adoption, implementation and consequences |
| Santarelli & D'Altri (2003) | e-commerce | Implementation, desired consequences | Identify implementation problems and desired consequences |
| Thong (1999) | IS innovations | Adoption | CEO characteristics, innovation characteristics, and organisational characteristics determine adoption of IS in SMEs. Environmental characteristic does not influence adoption. |
| Premkumar (2003) | Computer mediated communication technologies | Adoption and implementation | Competitive advantage, management support and SME size critically influence adoption<br>Cost not a major adoption driver<br>Top management support critical during implementation phase |

**Table 1: Research on IS innovation diffusion in SMEs**

There are six contributions that investigate the diffusion of IS innovations among SMEs. Four of these study specific innovations: e-mail (Sillince, et al., 1998), CAD-CAM (Panizzolo, 1998) and e-commerce (Kendall, et al., 2001, Santarelli & D'Altri, 2003). One contribution looks at IS innovation in general (Thong, 1999) and one (Premkumar, 2003) studies a specific group of IS innovations, computer-mediated communication technology innovations. None investigates the diffusion of the ASP innovation among SMEs. The phases of the innovation process studied include adoption, implementation and consequences. Whereas all except one (Santarelli & D'Altri, 2003) include the adoption phase and only three (Panizzolo, 1998, Santarelli & D'Altri, 2003, Sillince, et al., 1998) out of six include consequences, none makes generalisations about the complete IS innovation process for SMEs. The two studies (Panizzolo, 1998, Sillince, et al., 1998) that do include all the stages of the innovation process are innovation-specific, presenting findings for e-mail and CAD-CAM innovations respectively. Thus knowledge about the diffusion of IS innovations among SMEs is fragmented and the complete IS innovation process in SMEs remains to be studied.

Given the definition of innovation as an idea, practice, or object that is new to the adopting unit (Rogers, 2003), IS that are adopted by SMEs are new to the firm regardless of how old or new they may be to other units of adoption (Damanpour & Evan, 1984, Newell, et al., 2000). ASP not only embodies the characteristics of an IS innovation as it is new to the market, it is also an innovation in terms of being new to the SME adopting it. This understanding of innovations suggests that when SMEs adopt IS these IS are innovations for the adopting SMEs. This first section of chapter three synthesises the diffusion, among SMEs, of IS innovations with innovation characteristics that is the innovations are new to the market. The following section reviews the literature on IS in SME, as, regardless of the newness of the IS to the market, IS are innovations for SMEs.

## 3.2 IS diffusion among SMEs

As diffusion is primarily concerned with adoption, implementation and consequences of innovations, this section reviews literature on the adoption, implementation and consequences of IS in SMEs. The section begins with an introduction to IS in SMEs.

IS and IT are increasingly important for SMEs. In 2003, nearly three quarters of UK SMEs used PCs, more than half used e-mail and the internet and approximately 38% had a business website (Small Business Service, 2002). Some 25% of SMEs did not use any form of IT in 2003. In 2004, only 19% of UK SMEs do not use any information and communications technologies (ICT) at all. Most of these SMEs without ICT have no or few employees (Small Business Service, 2005a). Thus SMEs increasingly use IS and IT.

SMEs generally lag behind large firms in their use of IS and IT resulting in limited use of IS (Levy & Powell, 2005). When SMEs decide to use their limited resources to invest in IS, this is usually done in response to a specific identified need (Levy & Powell, 2000). Thus SMEs tend to invest in IS incrementally. Additionally, SMEs commonly lack IS knowledge and skills (Ballantine, et al., 1998, Levy & Powell, 2005, Pollard & Hayne, 1998). A further key difference between IS in SMEs and large firms is that the owner-manager(s) of SMEs play a key role in IS matters and decisions (Chau, 1995, Cragg & King, 1993, Premkumar & Roberts, 1999, Thong, et al., 1997).

The following sub-sections review the adoption, implementation and consequences of IS respectively.

### 3.2.1 IS adoption in SMEs

Scholars have studied the adoption of different IS in SMEs and commonly identify the factors that determine adoption. Iacovou & Benbasat (1995) for example study EDI adoption in SMEs finding that three factors, perceived benefits, organisational readiness and external pressure, significantly affect EDI adoption in SMEs. Kuan and Chau (2001) also study EDI adoption in SMEs. These authors find that whilst SMEs tend to lack resources and skills necessary for IT adoption, organisational, environmental and the perceived benefits of the technology significantly influence adoption. The same three factors originally identified by Iacovou & Benbasat (1995) are found to significantly influence internet adoption by SMEs (Mehrtens, et al., 2001). Yet, contradictory to Mehrtens et al. (2001), Levy and Powell (2003) find only limited evidence for external pressure affecting internet adoption in SMEs.

Whilst the abovementioned studies investigate the adoption of specific IS, another approach is to explore IS adoption in SMEs per se. Fink (1998) for example studies the influence of internal factors (benefits of IT, organisational culture, internal resources, in-house IT expertise, IT selection, and IT implementation) and external factors (outside support, external resources, availability of IT, external environment) on the adoption of IT. He finds that internal factors are more significant for the adoption of IT than external factors and that firm size has no effect on the adoption decision. Caldeira and Ward (2002) similarly find that internal factors are core determinants of IS adoption in SMEs. Two factors are particularly important: top management perspectives and attitudes and IS/IT competencies of the firm.

Thus three factor clusters emerge that determine the adoption of IS and IT in SMEs: internal factors such as owner-manager and organisational characteristics; external factors such as pressures from competitors and support available; and IS characteristics particularly in terms of perceived benefits associated with the adoption of the specific IS. These clusters can also be identified for IS innovation adoption in SMEs: section 3.1.1 uncovers that IS innovation adoption is usually determined by internal factors

such as CEO characteristics and organisational characteristics and innovation characteristics (Thong, 1999). The external characteristic seems a situational determinant in IS innovation adoption as Thong (1999) finds no evidence for environmental characteristic (competition) determining adoption whereas Premkumar (2003) and Panizzolo (1998) find evidence for external influence. The factors identified by Panizzolo (1998) for CAD-CAM adoption also fall into the three clusters: perceived advantage refer to innovation characteristics, internal constraints is an internal factor and external context falls into the external group. Of the remaining IS innovation in SME studies that include adoption, Kendall, et al. (2001) focus solely on the innovation characteristic cluster. The reasons for adoption identified by Sillince et al. (1998) can easily be grouped into these three clusters: faster communication = innovation characteristic, other organisations with which the SME communicates use it = external context, and assist integration of work functions = internal context.

IS/innovation characteristics and internal and external context therefore determine IS and IS innovation adoption in SMEs. Following the adoption decision, the next phase in the diffusion of IS in SMEs is implementation.

### 3.2.2 IS implementation in SMEs

The literature not only facilitates knowledge about IS adoption in SMEs, there is also research interest in IS implementation in SMEs. What is known to date is that internal and external factors determine the successful implementation of IS in SMEs. Support and top management support in particular are key internal factors that facilitate the successful implementation of IS in SMEs (Caldeira & Ward, 2002, Fink, 1998, Thong, et al., 1997). Other internal factors critical for the successful implementation of an IS include training on the IS available to users and employees and the quality of this training (Caldeira & Ward, 2002, Fink, 1998, Grandon & Mykytyn, 2004, Heikkila, et al., 1991, Riemenschneider, et al., 2003). The technology environment existing in the firm further influences the implementation as internal systems may have to be modified and procedures changed (Grandon & Mykytyn, 2004, Riemenschneider, et al., 2003). The other technology environment issue is integration of the new IS with existing systems (Fink, 1998). The last factor in the internal group is the cost associated with implementation (Heikkila, et al., 1991, Riemenschneider, et al., 2003). External factors determining IS implementation success are external expertise available to the SME for,

and during, the implementation process and support from the vendor (Thong, et al., 1996, 1997).

Some of the factors identified above are also found to determine the successful implementation of IS innovations in SMEs. Top management support for example is a key variable for the successful implementation of IS innovations (Premkumar, 2003), as is training for users (Panizzolo, 1998). Panizzolo further finds that integrating the IS innovation with existing IS positively affects implementation and that changes to the organisational structure also influence implementation success. External support from vendors is also critical during the implementation phase according to Panizzolo.

Again, there is considerable overlap between IS implementation and IS innovation implementation findings. Similar to adoption, internal and external variables significantly affect the successful implementation of IS and IS innovations in SMEs.

### 3.2.3 IS consequences for SMEs

Whereas Beynon-Davis (2002) proposes that organisations only invest in IS to increase efficiency and effectiveness there are many more potential effects for organisations from the adoption and use of IS. These effects can be positive or negative. Similarly, Rogers (2003) proposes that innovations have desired (positive) and undesired (negative) effects for their adopters. Yet, there may be no effects at all for organisations from the adoption of IS (Beynon-Davis, 2002).

The literature on IS consequences in SMEs commonly measures the factors that influence IS success: Igbaria et al. (1998), for example, identify factors that affect the success of computing in SMEs; Naylor and Williams (1994) identify factors which contribute to IT success in SMEs; Heikkila, et al. (1991) evaluate factors that determine the success of software packages in SMEs; and DeLone (1988) investigates factors that affect the successful use of computer based IS in SMEs. The factors that critically influence IS success in SMEs are as follows.

The attitudes and beliefs of chief executives and their knowledge of computers is the key critical factor for IS success in SMEs (DeLone, 1988, Igbaria, et al., 1998). In terms of IT, the successful use again depends significantly on the ability of managers and

other staff to use information in previously unplanned ways (Naylor & Williams, 1994). Igbaria et al. (1998) finds that small firms depend more on extra-organisational factors such as external training and support than on inter-organisational factors such as internal training and support, than large firms. Heikkila et al. (1991) point out that IS success in SMEs depends on four categories of variables: success of the implementation, quality of the software package, information fit and organisational impacts. Heikkila et al. (1991) and Naylor and Williams (1994) are the only contributions that specifically identify organisational impacts for SMEs from the adoption and implementation of IS. Organisational impacts include cost savings, time savings, resource savings and improved control on business (Heikkila, et al., 1991). Time savings, more professional image, reduced administration costs, better stock control, improved sales analysis, improved forecasting and increased services or turnover are the positive factors identified by Naylor & Williams (1994). Heikkila et al. (1991) additionally present ease of use and user-friendliness as impacts for individuals working for the SMEs.

Overall, consequences from IS adoption and implementation can be experienced by the SME and the employees of the SME. Yet, research on the effects of IS for SMEs is scarce and positive-biased. Undesired or negative consequences of IS for SMEs is a neglected area of study. Whilst the IS success in SMEs literature does offer insight as to what factors potentially have a negative effect on SME success, negative consequences of IS are not understood for SMEs.

In comparison, three studies (Panizzolo, 1998, Santarelli & D'Altri, 2003, Sillince, et al., 1998) identify IS innovation consequences for SMEs in the context of the specific solutions studied. However, none of these studies generalises to notions about consequences for SMEs. Thus consequences of both, IS and IS innovations, are barely understood for SMEs.

Hitherto, this chapter has reviewed literature on innovation and IS in SME with a particular focus on diffusion. Whilst certain aspects of IS and IS innovation adoption and implementation in SMEs have been investigated, consequences are barely understood. The remaining literature to be explored in the SME context is about ASP, which follows in the next section.

## 3.3 ASP in SMEs

Since ASP is an emerging innovation, understanding of ASP is limited (Jayatilaka, et al., 2003). With the ASP concept being barely understood by SMEs, the diffusion of ASP among SMEs is low (Johansson, 2004). Emerging literature on ASP shows a substantial lack of empirically grounded research on ASP in SMEs. Most contributions on ASP are based on evidence from ASP providers and merely emphasise the suitability of the ASP concept for the purposes of SME clients. This section reviews contributions concerning ASP in SMEs. It commences with a synthesis of empirical studies on ASP in SME followed by a review of adoption, implementation and consequence propositions formulated for ASP in SMEs.

The ASP innovation enables SMEs to procure computer applications that they normally cannot afford (Currie & Seltsikas, 2001). ASP thus can be an alternative to complex and costly IT acquisition and implementation for SMEs (Heart & Pliskin, 2002). These early contributions on ASP in SMEs emphasise cost as the core determinant for ASP adoption in SMEs. Johansson (2003), however, finds that cost is not a key determinant but core competence, lack of skilled personnel and the SME's overall strategy are determinants. Furthermore, SMEs tend to view ASP as something operational rather then strategic as there are no indications that it may improve their business over a longer period of time (Johansson, 2004). More recently, Lockett et al. (2006) find that for their sample of SMEs, cost was the most significant driver for ASP adoption. These conflicting findings regarding cost as a determining ASP adoption factor highlight the need for further research.

The aforementioned empirical contributions on ASP in SMEs investigate the adoption phase of the diffusion process in SMEs. There is no empirical evidence regarding ASP implementation and consequences for SMEs. As these are all the empirical studies based on evidence from SMEs, there is a substantial lack of empirical evidence from SMEs about ASP.

Although there is this significant lack of empirical evidence from SMEs about ASP, lots has been proposed about ASP and SMEs. Sources of evidence are ASP providers (Brown & Lockett, 2004, Currie, 2004b, Currie & Seltsikas, 2001, Kern, et al., 2002a), large firm customers (Susarla, et al., 2003), combinations of ASP providers and customers (Currie, 2003, 2004a) and large and small ASP customers (Weerakkody, et

al., 2003). Sources of theoretical evidence are concerned with ASP in general (Dewire, 2000, Soliman, 2003, Tebboune, 2003, Walsh, 2003), ASP clients (Smith & Kumar, 2004) and specific ASP solutions such as ERP systems (Bryson & Sullivan, 2003). The propositions from these studies that are applicable to SMEs are synthesised in the following sub-sections, structured according to the phases of the diffusion process.

### 3.3.1 Adoption propositions

This sub-section investigates the factors that can determine ASP adoption in SMEs. As many factors have been proposed to influence ASP adoption in SMEs, the section develops and discusses four adoption clusters: perceived benefits, resource shortages, financial incentives, and technical factors. The adoption determinants in each cluster are presented in Table 2, including their sources.

| *Classification* | *Adoption determinants* | *Reference* |
|---|---|---|
| Perceived benefits | Enables focus on core competencies | (Cherry Tree & Co., 1999, Curtis, 2000, Dewire, 2000, Kern, et al., 2002b) |
| | Improves efficiency | (Cherry Tree & Co., 1999, Currie, 2003, Curtis, 2000, Kern, et al., 2002b) |
| | Gives flexibility | (Dewire, 2000, Kern, et al., 2002b) |
| | Provides competitive advantage | (Curtis, 2000, iT2, 2002, Kern, et al., 2002b) |
| | Trial opportunity | (Weiss, 2001) |
| | Improves customer service | (Weerakkody, et al., 2003) |
| Resource shortages | Addresses resource shortages | (Weiss, 2001) (Dewire, 2000) |
| | Gives access to skills, applications, services and emerging technologies | (Cherry Tree & Co., 1999, Currie, 2003, Dewire, 2000, iT2, 2002, Kern, et al., 2002b, Weerakkody, et al., 2003) |
| Financial incentives | Cost risk reduction | (Dewire, 2000) |
| | Cost savings | (Cherry Tree & Co., 1999, Currie, 2003, iT2, 2002, Kern, et al., 2002b, Weerakkody, et al., 2003) |
| | Cost predictability | (Cherry Tree & Co., 1999, Currie, 2003, iT2, 2002, Kern, et al., 2002b, Weerakkody, et al., 2003) |
| | Cost reductions | (Curtis, 2000, Dewire, 2000) |
| Technical | Responsibility shift | (Cherry Tree & Co., 1999, iT2, 2002) |
| | Improved IS | (Currie, 2003, Dewire, 2000, iT2, 2002, Kern, et al., 2002b, Weerakkody, et al., 2003) |
| | Prerequisites are low | (iT2, 2002) |

**Table 2: ASP adoption determinants**

The first cluster, perceived benefits, synthesises the benefits that SMEs may perceive from the adoption of an ASP solution. The first determinant in this cluster is that ASP

can enable SMEs (Cherry Tree & Co., 1999, Curtis, 2000, Dewire, 2000, Kern, et al., 2002b), the management of SMEs (Currie, 2003, Weerakkody, et al., 2003) and SME IT departments and staff (Dewire, 2000, iT2, 2002) to focus on their core competencies. The second determinant is that ASP can improve efficiency: time savings can be realised through increased roll-out speed for applications (Kern, et al., 2002b) and increased speed to market (Currie, 2003). Efficiency of internal IT staff can also be increased by eliminating application management and upgrades (Cherry Tree & Co., 1999, Curtis, 2000) and end-user efficiency can increase as upgrades do not need to be installed (Curtis, 2000). Another potential perceived advantage is that ASP can increase SME flexibility through scalability of applications (Kern, et al., 2002b) and flexible solutions (Dewire, 2000). ASP can further enable SMEs to gain competitive advantage. This can arise from access to skills, applications and services not available otherwise (Kern, et al., 2002b) and from time and cost savings (Curtis, 2000, iT2, 2002). The final two determinants are that the ASP model permits SMEs to trial software before buying it (Weiss, 2001) and that it can improve the SMEs' service provided to customers (Weerakkody, et al., 2003).

The second cluster is resource shortages. Many SMEs are constrained by resource shortages. These constraints such as lack of internal resources (Weiss, 2001) and lack of IT department resources (Dewire, 2000) can drive the adoption of ASP-based computer applications in SMEs. ASP gives SMEs access to skills, applications, services and emerging technologies that may be scarce or not available otherwise to the SME (Cherry Tree & Co., 1999, Currie, 2003, Dewire, 2000, iT2, 2002, Kern, et al., 2002b, Weerakkody, et al., 2003).

The third cluster is financial incentives. ASP can reduce cost risks by eliminating the need to buy software (Dewire, 2000). ASP further can enable SMEs to realise significant cost savings (Kern, et al., 2002b) by minimising total cost of ownership (Cherry Tree & Co., 1999, Currie, 2003), avoiding large capital investment (iT2, 2002) and eliminating the need for paying up-front for software licences (iT2, 2002, Weerakkody, et al., 2003). The third factor within the financial classification is cost predictability. ASP makes IT costs more predictable (Currie, 2003, Kern, et al., 2002b, Weerakkody, et al., 2003) by having a monthly subscription rate (iT2, 2002) and by having a predicable cash flow as a result of the elimination of uncertainties related to software expenditures (Cherry Tree & Co., 1999). The fourth determinant is cost

reduction. The adoption of ASP can potentially reduce implementation costs (Dewire, 2000). ASP can further reduce operating costs and system administration overhead (Curtis, 2000) and can reduce cost by minimising internal IT staff and using existing infrastructure (Weerakkody, et al., 2003). The difference between the cost reduction factor and the cost savings factor is that existing cost is reduced at the cost reduction factor whereas cost does not occur at the cost savings factor.

The fourth cluster is technical factors. Three determinants, responsibility shift, improved IS, and low prerequisites, are positioned in this cluster. ASP shifts IT and IS responsibilities from the organisation to the provider: the ASP provider is responsible for controlling, maintenance and management of the solution (iT2, 2002), has to deal with rapidly changing and increasing complexity of technology, and the application ownership risk is transferred to the provider (Cherry Tree & Co., 1999). ASP can also potentially improve the SME's IS: it can improve systems and information by perpetual maintenance from the provider and access to latest version of software (Dewire, 2000). SMEs can further benefit from data security and integrity, disaster recovery back-up and restore procedures (Currie, 2003, Kern, et al., 2002b) and regular upgrades (iT2, 2002). ASP applications are generally available through the internet (Weerakkody, et al., 2003), twenty-four hours seven days a week (Currie, 2003, Weerakkody, et al., 2003) with a 99.9% availability (Kern, et al., 2002b) presenting another improvement to the quality of the organisation's IS. ASP solutions are also flexible in terms of scalability as users can be easily added or removed from the service (Kern, et al., 2002b). The third determinant within this cluster is that technical prerequisites for ASP adoption are very low as only a suitable browser and internet access are required (iT2, 2002).

Whilst numerous adoption propositions are synthesised and discussed in the above paragraphs and Table 2, there are also factors that prevent SMEs from adopting ASP-based computer applications. Yet, there are only two studies (Cherry Tree & Co., 1999, Curtis, 2000) that propose potential inhibitors to ASP adoption in relation to eight studies presenting potential adoption drivers. Thus the ASP adoption in SMEs literature is pro-adoption biased.

Potential barriers to ASP adoption in SMEs include security of information, overall quality of service and support, scope and flexibility of services, and adaptability of software (Cherry Tree & Co., 1999). Ensuring the security of client information is a

challenge for ASP providers, particularly when the information is critical. Overall, quality of service and support refers to the performance of the provider in terms of application availability, scalability and potential failures to provide the service and support. Scope and flexibility of the service refers to the ability of the provider to accommodate for all demands of the front and back-end of the service and react to changing demands. The final potential barrier to ASP adoption is the adaptability of software which refers to the inability of ASP providers to web-enable the software. Curtis (2000) classifies differently by identifying fear factor, reliability factor, security of confidential information and proprietary practices, and capital costs to implement. Fear can be an obstacle to ASP adoption as SMEs may fear changes to technology, new methods and new services. SMEs can also be concerned about outsourcing critical services and loosing control over vital information and processes. Network reliability refers to the problematic issue of network problems that can make critical solutions unavailable to SMEs; and in rural areas, network access may be a particular problem with access not being available 24/7. Security of data and confidential data is another concern for ASP clients who are exposed to hackers through the ASP model. The fourth issue identified by Curtis (2000) is capital cost to implement. The essential capital cost of ASP is to establish high speed connectivity to the network for each desktop. Other cost can be for a back-up server for critical data and web-enablement of legacy applications.

When SMEs have decided to adopt ASP-based computer applications, these solutions are usually implemented. ASP implementation propositions for SMEs are discussed in the following sub-section.

### 3.3.2 Implementation propositions

The successful implementation of ASP solutions is fostered by organisations that consider trial opportunities, provide training and support for users and try to establish a good working relationship with the provider whilst implementing an ASP solution (Smith & Kumar, 2004). When implementing ASP solutions SMEs should further consider the integration of ASP across multiple customer platforms, sites and environments and possible resulting business process re-design (Currie, 2003).

Unique to the ASP concept is that it can foster faster software implementation and eliminate problems related to managing daily IT activities and internal IT staff (Cherry Tree & Co., 1999, Currie, 2003, Kern, et al., 2002b, Weerakkody, et al., 2003, Weiss, 2001). SMEs can further benefit from reduced complexities involved in installing software and reduced implementation cost (Dewire, 2000) as well as easy transfer of existing data to ASP solutions (Currie, 2003).

Although these implementation issues have been proposed, empirical research on the implementation of ASP in SMEs is scarce. The above illustrates that SMEs can potentially benefit from fast ASP implementation, flexibility and manageability yet integration may pose a problem. The lack of empirical evidence however points to a need for research on the implementation of ASP in SMEs to validate these proposals.

Once implementation of ASP-based applications is completed, SMEs experience consequences. The following sub-section reviews these potential consequences.

### 3.3.3 Consequence propositions

This section reviews potential consequences for SMEs from the adoption and implementation of ASP. SMEs can experience desired and undesired consequences from the adoption and implementation of ASP. Desired consequences are positive effects of ASP for the SME and the individual workings for the SME. Undesired consequences are negative effects of ASP for the SME and the individuals working for the SME. Alternatively, SMEs may experience no effects at all. This section respectively reviews desired, undesired and other consequences proposed for ASP in SMEs.

#### 3.3.3.1 Desired consequences

Similar to ASP adoption determinants in SMEs, this sub-section clusters desired consequences from ASP adoption and implementation for SMEs into four categories: benefits realised, resource shortages addressed, financial gains and IS strategy changes. Table 3 presents the consequences for each cluster and their origins. With the lack of empirical evidence from SMEs, it is not surprising that consequences and adoption determinants proposed are often identical.

| *Classification* | *Potential consequences* | *Reference* |
|---|---|---|
| Benefits realised | Enables focus on core competencies | (Currie, 2003, Weiss, 2001) |
| | Efficiency gains | (Cherry Tree & Co., 1999, Currie, 2003, Liddle, 2001, Weerakkody, et al., 2003, Weiss, 2001) |
| | Flexibility gains | (Currie, 2003) |
| | Improved customer service | (Currie, 2003) |
| Resource shortages addressed | Gives access to skills, applications, services and emerging technologies | (Currie, 2003, Kern, et al., 2002a, Liddle, 2001, Weiss, 2001) |
| Financial gains | Cost effective | (Currie, 2003, Weiss, 2001) |
| | Cost predictability | (Currie, 2003, Smith & Kumar, 2004, Weiss, 2001) |
| | Cost reduction | (Currie, 2003, Kern, et al., 2002a, Liddle, 2001, Smith & Kumar, 2004, Walsh, 2003) |
| IS strategy changes | Flexibility | (Kern, et al., 2002a, Weerakkody, et al., 2003) |
| | Fills resources gaps | (Currie, 2003, Kern, et al., 2002a) |

**Table 3: Proposed desired ASP consequences**

In the first cluster, benefits realised, ASP enables SME management (Currie, 2003) and IT staff (Weiss, 2001) to focus on their core activities. SMEs are further able to realise efficiency gains (Currie, 2003, Liddle, 2001, Weerakkody, et al., 2003, Weiss, 2001) such as faster and cheaper software upgrades and reliable back-up and restore procedures. The other two proposed benefits are flexibility gains -greater flexibility of ASP as opposed to in-house software application management- and ASP-induced customer service improvements (Currie, 2003). The second cluster, resource shortages addressed, includes the desired consequence that ASP gives SMEs access to experts, skills and solutions not available otherwise (Currie, 2003, Kern, et al., 2002a, Liddle, 2001, Weiss, 2001). The third cluster is financial gains: many (Currie, 2003, Kern, et al., 2002a, Liddle, 2001, Smith & Kumar, 2004, Walsh, 2003) identify cost reductions such as lower hardware/software cost and lower transaction cost, as a desired consequence of ASP adoption and implementation. Cost predictability also improves: IT costs are more visible (Currie, 2003) and predicable through the pay-as-use pricing model (Smith & Kumar, 2004, Weiss, 2001). ASP is further considered more cost effective than buying applications (Weiss, 2001) and more cost effective than IS outsourcing (Currie, 2003). The remaining group gathers IS strategy changes: ASP can offer organisations greater flexibility as opposed to in-house management of software as ASP contracts are normally flexible and short-term (Kern, et al., 2002a, Weerakkody, et al., 2003), and ASP can fill gaps in IT resources (Kern, et al., 2002a).

While numerous desired consequences of ASP are proposed for SMEs, scholars do suggest undesired consequences for SMEs from the use of ASP-based solutions. These undesired consequences proposed are presented in the following section.

### 3.3.3.2 Undesired consequences

Undesired consequences are negative effects of ASP for SMEs and employees working for the SMEs. Following the approach taken so far in this chapter, undesired consequences are clustered into various groups and presented in Table 4. Five clusters emerge: network issues, service issues, integration issues, cost issues and provider issues.

| *Classification* | *Consequences* | *Reference* |
|---|---|---|
| Network issues | Application unavailability | (Cherry Tree & Co., 1999, Hoffman & Kashmeri, 2000, Kern, et al., 2002b, Weiss, 2001) |
| | Slow application response time | (Kern, et al., 2002b) |
| Service issues | Security provided | (Cherry Tree & Co., 1999) |
| | Reliability | (Curtis, 2000) |
| | Data recovery and emergency procedures | (Hoffman & Kashmeri, 2000) |
| Integration issue | Lack of integration | (Kern, et al., 2002b) |
| Cost issues | Unanticipated costs | (Curtis, 2000, Kern, et al., 2002b) |
| Provider issues | Lack of qualified provider staff | (Kern, et al., 2002b) |
| | Reliability and viability | (Cherry Tree & Co., 1999) |
| | Goes bankrupt | (Hoffman & Kashmeri, 2000) |
| | Dependency | (Kern, et al., 2002b) |

**Table 4: Proposed undesired ASP consequences**

In the first cluster, undesired consequences originate as a result of the network component of the ASP model. Owing to the network dependability, ASP-based applications may become unavailable to the SME. The network can further cause slow application access and response (Cherry Tree & Co., 1999, Hoffman & Kashmeri, 2000, Kern, et al., 2002b, Weiss, 2001). Potential undesired consequences may also arise due to service issue. Security of data and information provided by the vendor (Cherry Tree & Co., 1999), reliability of the service (Curtis, 2000) and data recovery and emergency procedures (Hoffman & Kashmeri, 2000) can cause service-related undesired consequences. The integration issue refers to undesired consequences emerging as a result of non-integration of the ASP-based application with other IS of the SME (Kern, et al., 2002b). The cost issue emphasises that SMEs may be subject to unanticipated

costs associated with the ASP solution (Curtis, 2000, Kern, et al., 2002b). The remaining cluster is provider issues: the provider of the ASP solution can be a source of numerous undesired consequences for SMEs. Undesired consequences, for example, can originate from a lack of qualified provider staff (Kern, et al., 2002b), and include the reliability and viability of the provider (Cherry Tree & Co., 1999). Further, there is the probability of the provider going bankrupt which can leave an SME customer in a difficult situation. The dependency on the ASP provider can also be a problem when as knowledge about business functions is not held internally (Kern, et al., 2002b).

In addition to desired and undesired consequences for SMEs from the adoption and implementation of ASP-based applications, scholars propose other consequences. The following section reviews these other consequences.

#### 3.3.3.3 Other consequences proposed

Besides desired and undesired consequences, ASP consequences relating to business transformation, client/vendor relationship issues and risks are available from the literature.

Business transformation happens as, most certainly, the adoption and implementation of an ASP solution will cause role changes for IS employees and managers (Smith & Kumar, 2004); enable SMEs to keep pace with the latest information and communication technologies; and integrate IS with their core business (Currie, 2003). The adoption and implementation of an ASP solution may further cause SMEs to treat IS as a service to the core business and to gain senior management support for IS.

The ASP concept incorporates a relationship element which has consequences for organisations: SMEs for example should seek to get good SLAs; consider that the financial stability of the vendor is critical, try to develop a trust relationship with the vendor and consider market turbulence and uncertainty (Currie, 2003). SMEs need to manage their relationship with the vendor (Kern, et al., 2002b). ASP providers need to facilitate integration with existing IT in client organisations, ensure superior performance delivery, emphasise rigorous enforcement of SLA and ensure that their application meets standards of software capability (Susarla, et al., 2003).

The remaining group of consequences that needs consideration when adopting and implementing ASP solutions is risks associated with ASP. The dependency on a third-party provider to deliver applications is a key source of risk associated with ASP. The vendor for example could provide inferior service, go bankrupt or postpone upgrades to save cash (Bryson & Sullivan, 2003); or force pricing changes for application updates and services (Kern, et al., 2002a). The second vendor-related risk issue is that the SME loses control over data and thus depends heavily on the ASP provider with the relationship with the provider being key (Currie, 2003). Another ASP risk issue is associated with the network delivery of the service: SMEs need reliable, high-speed network connections for ASP (Currie, 2003, Kern, et al., 2002a) which can be a source of security risks. Table 5 presents these risks and clusters them accordingly

| *Classification* | *Risk* | *Reference* |
|---|---|---|
| Vendor related | Provide inferior service | |
| | Goes bankrupt | (Bryson & Sullivan, 2003) |
| | Postpones upgrades | |
| | Forces pricing changes | (Kern, et al., 2002a) |
| Loss of control over data | Heavily dependent on provider | (Currie, 2003) |
| Network dependency | Reliability | |
| | High-speed network connection needed | (Currie, 2003, Kern, et al., 2002a) |

**Table 5: Proposed risk ASP consequences**

While scholars propose many factors affecting the various phases of the ASP diffusion process in SMEs, empirical evidence lacks. To address this empirical evidence, and guide the research through the various stages, the following section introduces a conceptual framework.

## 3.4 Conceptual framework

This chapter uncovers that knowledge about the diffusion of IS innovations, IS and ASP in SMEs is fragmented and scarce. Whilst plenty is being proposed about ASP in SMEs, contributions based on empirical evidence from SMEs is lacking. To address this scarcity, research on ASP diffusion in SMEs is proposed. This section presents the conceptual framework (Figure 6) that is developed to guide the proposed research.

The basis for the conceptual framework is Rogers' (2003) innovation process for organisations. As discussed in chapter two, this process model consists of five sequential stages: agenda-setting and matching which lead up to the decision to adopt an innovation; and redefining/restructuring, clarifying and routinizing. Rogers' model is

chosen as basis because it is a contemporary model that depicts the general pattern of innovation stages for organisations. Thus it is suitable for the purpose of investigating ASP diffusion in SMEs. Whilst diffusion is commonly associated with adoption and implementation, only few studies investigate consequences of IS and IS innovations for SMEs. To address this lack of knowledge, consequences of ASP are included.

With the research objective being 'to investigate the diffusion of ASP among SMEs', the research question becomes 'How does an IS innovation, ASP, come to be adopted by, and diffused within, SMEs?'. Based on the various diffusion phases, four research sub-questions are formed that enquire about each phase. The first question refers to the adoption phase and asks 'Why do SMEs adopt ASP?'. The second question enquires about the implementation asking 'How do SMEs implement ASP?'. The third question 'How do SMEs manage ASP?' and the fourth question 'What consequences do SMEs face from adopting and implementing ASP?' are posed to foster understanding of ASP consequences for SMEs. These four core questions are directly associated with the actual questions posed to the SMEs.

The conceptual framework is a process model, in line with the process nature of diffusion. It consists of three sub-processes or phases: it begins with initiation, followed by implementation and finally consequences. The initiation phase contains four stages. The first stage, an organisational problem identified by the SME, creates a need for an IS. This IS need is the second stage which is followed by the third stage, a search to satisfy the arising IS need. This search uncovers an ASP-based IS that matches the SME's IS need. Matching the ASP solution to the IS need is the final stage of the initiation phase. This initiation sub-process causes the adoption of ASP by the SME. The initiation phase incorporates Rogers (2003) agenda setting and matching stages. When the SME has made the decision to adopt an ASP-based solution, implementation follows. This is the second sub-process incorporating Rogers (2003) redefining/restructuring and clarifying stages. In the conceptual framework the implementation sub-process is represented by one single stage. Following phase one, ASP initiation, and phase two, ASP implementation, is phase three, ASP outcomes. This phase explores the consequences of ASP adoption and implementation for SMEs. Rogers (2003) routinizing stage represents a portion of this phase inquiring about the management of the ASP solution by the ASP. New to the diffusion process is the inquiry about consequences. Figure 6 explains the conceptual framework and shows

relationships between research questions, conceptual framework and Rogers' innovation process in organisations.

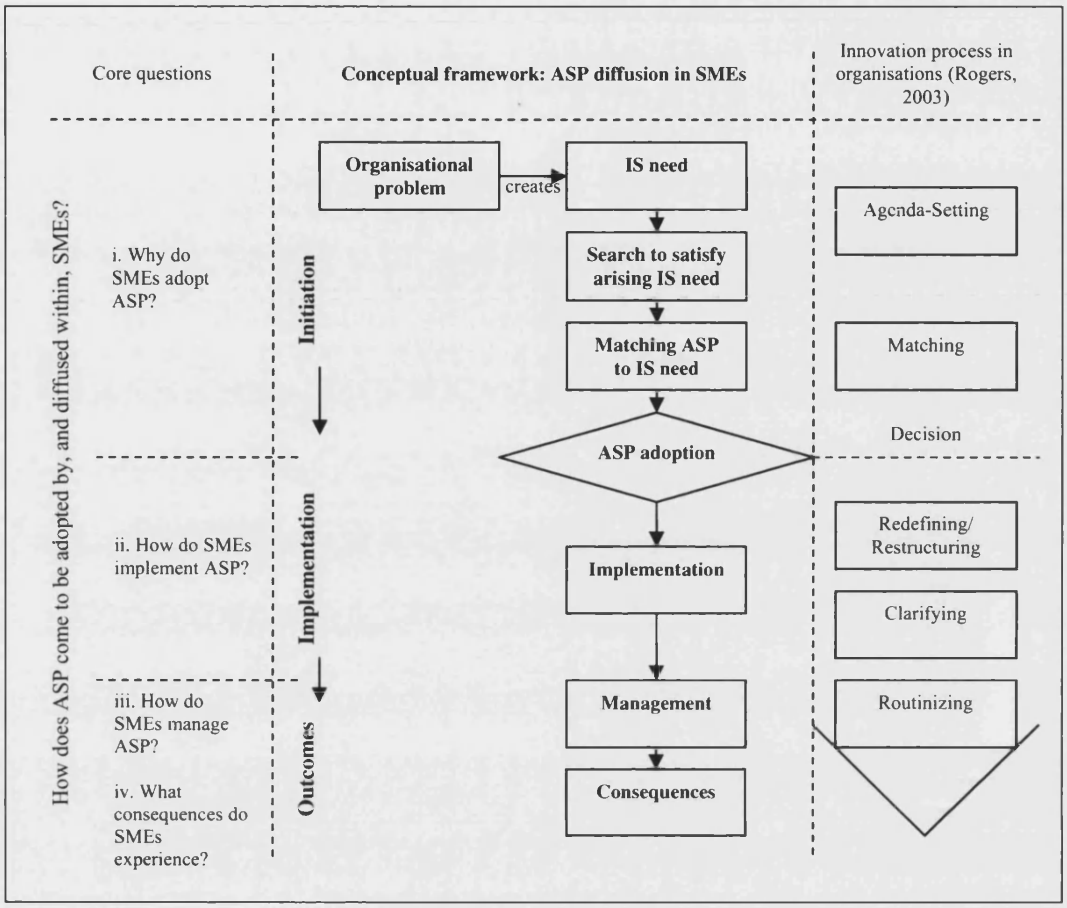


**Figure 6: Conceptual framework**

The conceptual framework adapts and elaborates on Rogers' theory in the ASP/SME context: it caters for the research questions posed and takes ASP and SME-specific issues outlined in the literature review into account. One key difference is the replacement of Rogers' redefining/restructuring, clarifying and routinizing stages with implementation, management and consequence stages. This change addresses one of the key shortcomings of innovation process stage models (section 2.3.2.1): it caters for the desirable and undesirable effects that result for SMEs from the adoption of ASP.

## 3.5 Chapter summary

Chapter three synthesises literature on innovation, IS and ASP in SMEs with an explicit focus on diffusion. The review suggests that knowledge about the innovation process in SMEs is fragmented and that empirical evidence from SMEs about ASP lacks. To

address these knowledge gaps, an innovation diffusion approach, adopting Rogers' innovation process in organisations as underlying theory, is proposed for studying ASP in SMEs. A conceptual framework consisting of three phases (initiation, implementation and outcomes) is developed to provide detailed understanding of ASP diffusion among SMEs.

# 4 CHAPTER FOUR: RESEARCH METHOD

The purpose of chapter four is to review research paradigms and methods and justify the research strategy applied to investigate the diffusion of ASP among SMEs. Thus, chapter four addresses the theoretical perspective that needs a priori attention in diffusion research (Wolfe, 1994).

The chapter commences with an introduction to research paradigms which is followed by a discussion about research strategy, including a review of research strategies employed in IS in SMEs research. An interpretive case study research strategy is selected. The second core part of chapter four presents the actual design of the research including case firms, sampling strategy, design phase, interview schedule and data collection. The chapter concludes with a discussion about qualitative data analysis.

## 4.1 Research paradigms

One problem that researchers face when exploring epistemological choices is the diversity of constructs and interchange-ability of terms. Consent among philosophers is that there are two dominant and opposed paradigms: the traditional positivist paradigm and the non-positivist, or interpretivist, paradigm (Lincoln & Guba, 2000). These contrasting views of how social science research should be conducted (Bryman & Bell, 2003) are subject to many ongoing debates originating in the different underlying philosophical assumptions about what constitutes valid research. Philosophical assumptions are based on the ontological and epistemological views of reality of the researcher (Guba & Lincoln, 1998). Ontology is the form and nature of reality and what there is to be known about it (Guba & Lincoln, 1998). Epistemology is the 'philosophical enquiry into the nature and scope of human knowledge' (Benton & Craib, 2001, p.181). The underlying motivation for epistemological enquiries is to distinguish knowledge from belief, prejudice and faith. One of the key arguments in the epistemology domain is what social position produces the most adequate form of knowledge. Ontology and epistemology are intertwined as the ontological view of the researcher influences epistemological preferences as well as methodological choices.

IS epistemology draws heavily from the social sciences (Hirschheim, 1992) and is dominated by two epistemological perspectives: positivist and interpretive (Orlikowski

& Baroudi, 1991, Sarantakos, 1998). These two perspectives are reviewed in the following paragraphs.

The positivist paradigm is the established standard view of science (Robson, 2002). Originating in the natural sciences, positivism has dominated social science research for many years (Lee, 1991, Sarantakos, 1998). Its key idea is that 'the social world exists externally, and that its properties should be measured through objective methods rather than being inferred subjectively through sensation, reflection or intuition' (Easterby-Smith, et al., 2002, p.28). Positivist researchers 'seek to explain and predict what happens in the social world by searching for regularities and causal relationships between its constituent elements' (Burrell & Morgan, 1979, p.5). The positivist school of thought proposes that organisational research needs to capture social reality in formal propositions, quantify it, and subject it to experimental controls (Lee, 1991) which is often difficult to achieve. A strong criticism of the positivist paradigm is the lack of human considerations, particularly for social science purposes. Interpretivist researchers argue that 'reality is determined by people, rather than by objective and external factors' (Easterby-Smith, et al., 2002, p.30). The interpretive researcher therefore 'interprets the empirical reality in terms of what it means to the observed people' (Lee, 1991, p.347). This contrasts the positivist view which gives little regard to the subjective state of the individual (Collis & Hussey, 2003). There is no unified interpretive approach, but rather different interpretive approaches, for example, phenomenology, hermeneutics and ethnography (Lee, 1991). Consent among the various approaches to interpretivism is that the methods of natural sciences are considered inadequate to the study of social sciences (Lee, 1991).

### 4.1.1 Paradigms in information systems research

Two paradigms dominate in information systems research: positivist and interpretivist. Positivist approaches have dominated pre-90s IS research (Orlikowski & Baroudi, 1991) yet, interpretivism, is increasingly being applied in post-90s IS research (Walsham, 1995a). As IS do not solely consist of technology but rely on people to operate, manage, use and interact with this technology (Land, 1992) the epistemological choice between positivism and interpretivism needs to be considered carefully by the IS researcher (Walsham, 1995a). Researchers need to make sure that they adopt a perspective that is 'compatible with their own research interests and predispositions,

while remaining open to the possibility of other assumptions and interests' (Orlikowski & Baroudi, 1991, p.24). Researchers, therefore, should acknowledge the various implications of adopting a certain perspective. A positivist epistemology underlying IS research, for example, disregards historical and social context which is a problem as IS are intrinsically embedded in these contexts; an incomplete picture of the IS studied may therefore emerge (Orlikowski & Baroudi, 1991). The interpretivist approach is commonly plagued by four shortcomings: the conditions which give rise to certain meanings and experiences are not examined; the unintended consequences of action are not explainable; it does not address structural conflicts within organisations and society; and it does not explain historical change (Orlikowski & Baroudi, 1991).

This research follows a broad interpretivist research approach: the ontological assumption is that reality is subjective and multiple as seen by participants in the study (Creswell, 1994, p.5). It is assumed that 'the social world is essentially relativistic and can only be understood from the point of view of the individuals who are directly involved in the activities which are being studied' (Burrell & Morgan, 1979, p.5). For IS research this implies that the researcher attempts to understand phenomena through the meanings that people assign to them (Klein & Myers, 1999). This approach is value-laden and biased which is one strong critique rallied by positivist researchers.

## 4.2 Research strategy

Following epistemological considerations, the research strategy, the general plan of how to carry out a study, illustrates the actual process of the research. The underlying broad interpretivist epistemology of this study suggests that action research, grounded theory, ethnography and case studies are suitable research strategies. These research strategies are commonly associated with research grounded in the interpretive paradigm. Strategies associated with the positivist paradigm include surveys, laboratory and field experiments, forecasting and simulation (Collis & Hussey, 2003, Easterby-Smith, et al., 2002, Robson, 2002, Saunders, et al., 2000). As this research is grounded in the interpretivist paradigm, the following paragraphs review action research, grounded theory, ethnography and case studies, research strategies commonly employed by interpretivist researchers.

Action research is a research strategy that emphasises collaboration between practitioners and researchers. As its name implies, action research is intended to achieve both action and research. This dual aim of action and research advocates action to bring about change and research to increase understanding on part of the researcher and the research community (Dick, 1993). Action research and some forms of practice, such as consulting, are in some ways similar. The core difference is that, unlike practice, action research is typically cyclic and critically reflective. In action research, cycles are used to challenge and refine results and frequent critical reflection is a formal and central part. Most practice is much less reflective and critical than action research. The underlying assumptions of action research as well as the participative nature (Heron & Reason, 1997) do not match the author's epistemological assumptions. This issue plus the suggestion that action research is likely to be a problematic research methodology for research trainees, such as doctoral students (Eden & Husham, 1996) makes action research unsuitable for the purpose of this research.

Grounded theory 'is an inductive, theory discovery methodology that allows the researcher to develop a theoretical account of general features of a topic while simultaneously grounding the account in empirical observations or data' (Martin & Turner, 1986, p.141). Whilst ASP is an innovation with little existing knowledge about it being available, a grounded theory approach is unsuitable as the study does not follow an inductive method of reasoning. The method of reasoning is concerned with the extent of theory at the beginning of a research project. In an inductive reasoning approach, theory emerges from observations, patterns and tentative hypotheses. In a deductive reasoning process, the other main method of reasoning, theory and hypotheses are developed and then tested (Easterby-Smith, et al., 2002, Saunders, et al., 2000, Trochim, 2000). This study follows a broad interpretivist approach by stating a theoretical framework and assumptions upfront (Chapter 3) but not specifically following a deductive or inductive method of reasoning.

Ethnography originates in anthropology, the study of people. It is concerned with understanding the meanings and significances that people, as research subjects, interpret. In order to understand these constructs, the researcher becomes part of the group under study (Easterby-Smith, et al., 2002, Saunders, et al., 2000). An ethnography research strategy is inappropriate as it is very difficult in SME research to become part of a group under study as access to SMEs is often limited in terms of

availability of respondents (Curran & Blackburn, 2001). Furthermore, it is not the people who are the focus of the study but a phenomenon, ASP, which is the other reason for dismissing this approach.

Besides the reasons given above, action research, grounded theory and ethnography are research strategies very little employed in SME research (Curran & Blackburn, 2001). The predominant research strategy in SME research is case studies (Curran & Blackburn, 2001).

A case study is an empirical inquiry that 'investigates a contemporary phenomenon within its real life context' (Yin, 1994, p. 13). Two guides for case study researchers are most frequently cited: Stake (2000) and Yin (1994). Whereas Stake (2000) is commonly associated with deep interpretivist approaches to case studies, Yin (1994) approaches case studies from a rather detached, more positivist point of view. Case studies can concentrate on single cases or multiple cases and consensus is that there are several main types of case study research. From the interpretive viewpoint three types of case studies are commonly identified: intrinsic, instrumental and collective (Stake, 2000). An intrinsic case study is undertaken because a researcher wants better understanding of a particular case only. An instrumental case study focuses on one particular case to provide insight into an issue or to redraw a generalisation. Whereas intrinsic and instrumental case studies concentrate on specific single cases, collective case studies focus on a number of, often instrumental, cases in order to investigate a phenomenon, population or general condition (Stake, 2000). These three, interpretive types of case study research are in contrast to five, more stringent defined, variations of case study research: exploratory, descriptive, illustrative, explanatory, and meta-evaluation (Collis & Hussey, 2003, Yin, 1994). Case studies can explore situations, describe interventions in the real life context, illustrate certain topics, explain causal links in real life interventions and can be evaluation studies (Yin, 1994).

The following section reviews and analyses research strategies employed in IS in SME research, as the research investigates ASP, an IS innovation, in the SME context.

### 4.2.1 Research techniques

Major research techniques for collecting primary data in management research include questionnaires, interviews and observation (Saunders, et al., 2000). A questionnaire is a set of predetermined questions posed to a sample of respondents. All respondents are asked identical questions in the same order. Interviews are purposeful discussions between two or more people that produce qualitative evidence in the form of words. Observation refers to the recording, description, analysis and interpretation of people's behaviour (Saunders, et al., 2000). Secondary data collection in contrast is a technique that analyses data originally collected for other purposes. As empirical research obtains real data and makes observations (Alavi, et al., 1989) questionnaires, interviews and observation are techniques used in empirical research.

## 4.3 Research strategies and techniques in IS-SME research

This section analyses research strategies applied to study IS in SMEs. Doctoral students commonly have limited experiences with research strategies (Cobbenhagen, 2000) as methodology in the social sciences is a 'learning process based on experiences with certain methodological choices in the practice of research' (p.53). The analysis of research strategies applied in the research of IS in SMEs thus supplies potential research strategies suitable for studying the diffusion of ASP in SMEs.

Orlikowski and Baroudi (1991) indicate that the positivist paradigm dominates IS research. Thus the majority of research strategies in the IS discipline should be associated with positivism. Whilst positivism dominates in the IS discipline, the most extensively used qualitative research method in IS research is case studies (Darke, et al., 1998). In the SME discipline, the predominant research strategy is case studies (Curran & Blackburn, 2001). Case studies and strategies associated with positivism therefore should be widely used in IS in SMEs research.

The research strategy analysis presented in this section is based on an in-depth review of articles on IS in SMEs published from January 1995 to December 2005 in sixteen journals in the IS, SME and management discipline. Journal publications are commonly regarded as the core outlet for academic research presenting a sound basis for analysing contributions to a field of study. Other publication outlets, including conferences and books, were excluded from the review. The IS journals examined were Management

Information Systems Quarterly (MISQ), Information Systems Research (ISR), Journal of Management Information Systems (JMIS), European Journal of Information Systems (EJIS), Information Systems Journal (ISJ), Journal of Strategic Information Systems (JSIS), Journal of Information Technology (JIT), and Information and Management (I&M). For the SME discipline, five journals were included: Small Business Economics (SBE), International Small Business Journal (ISBJ), Entrepreneurship Theory and Practice (ETP), Journal of Business Venturing (JBV), and Journal of Small Business Management (JSBM). The three generalist journals are Harvard Business Review (HBR), Sloan Management Review (SMR), and Management Science (MS). The rationale for selecting these journals is presented in the following paragraph.

Recent studies show that MISQ and ISR are regarded as the two top IS research journals (Saunders, 2005). The remaining IS journals were chosen from Mylonopoulos & Theoharakis (2001). JMIS and EJIS are included as these journals are ranked as top five journals in Europe and North America. ISJ, JSIS, JIT and I&M were chosen because these journals can be considered highly ranked. While there is less consensus among IS researchers on what constitutes top IS journals, in the SME discipline ETP, JSBM, JBV, SBE, ISBJ are commonly regarded as journals of high quality (Fried, 2003, Ratnatunga & Romano, 1997) which is the reason why these journals are included in the analysis. The generalist journals MS, HBR, and SMR are included as they are consistently ranked as significant by IS academics (Saunders, 2005) and SME scholars (Fried, 2003) alike. Although HBR and SMR are practitioner-orientated, these journals are frequently ranked highly.

In total, 7714 articles were examined and ninety-one of these are concerned with IS and IT in SMEs. The exhaustive approach of manually examining heading, keywords and abstracts of every single article published between 1995 and 2005 in the sixteen journals ensures a high validity and credibility of this investigation of IS-SME research strategies. Table 6 displays a summary of all articles reviewed. The Appendix presents detailed data including articles identified in each journal between 1995 and 2005, and the description for each journal as given by the publisher.

| *Discipline* | *Journal* | *Articles examined* | *Articles on SMEs & IS/IT* |
|---|---|---|---|
| IS | MISQ | 246 | 3 |
| | ISR | 250 | 4 |
| | JMIS | 406 | 1 |
| | EJIS | 248 | 13 |
| | ISJ | 182 | 3 |
| | JSIS | 188 | 5 |
| | I&M | 588 | 17 |
| | JIT | 270 | 3 |
| SME | SBE | 549 | 15 |
| | ISBJ | 229 | 11 |
| | JSBM | 365 | 10 |
| | ETP | 276 | 3 |
| | JBV | 335 | 1 |
| General | MS | 1379 | 2 |
| | HBR | 1742 | 0 |
| | SMR | 461 | 0 |
| | **Total** | **7714** | **91** |

**Table 6: Journal review**

Bearing in mind that the majority of firms in most economies are SMEs (Chapter 2), not a lot of research is concerned with IS/IT issues in SMEs. In total only 1.17% of articles published between January 1995 and December 2005 study IS/IT issues in SMEs. In the IS discipline 2.06% of articles are on IS/IT in SMEs, in the SME discipline 2.28% are on IS/IT in SMEs and in general management the figure is only 0.05%. The five SME journals have published the largest part of research articles on IS/IT issues in SMEs. It is striking that the two practitioner-focused journals, HBR and SMR, have not published one single article regarding IS/IT issues in SMEs over an eleven year period. Even when these two journals are excluded from the data, no more than 1.65% of articles published are on IS/IT in SMEs.

In terms of particular journals, the European focused EJIS has published most articles, 5.24% of the total, closely followed by ISBJ with 4.80%. JSBM, I&M, SBE and JSIS follow in the 2% margin with ISR, ISJ, MISQ, JIT and ETP in the 1% margin. JBV, JMIS and MS have all published less than 1%. The two top IS journals, American-based ISR and MISQ, publish much less in comparison to other IS journals. The general management journal MS, has the worst ratio of all journals. The number of articles published every year is between four and eleven, except in 2004 where sixteen articles were published. Of these sixteen articles, seven investigate e-issues in SMEs such as the internet, e-commerce and e-business. In summary, IS/IT research on SMEs is scarce and not representative of the influential SME population in many economies. IS/IT research seems to be particularly large firm biased.

Following the identification process which uncovers ninety-one articles on IS/IT issues in SMEs the next task was to analyse research methods employed in these articles. This analysis included articles gathering primary empirical data from SMEs as the proposed research is empirical in nature. Empirical studies provide concrete evidence by obtaining real data and observations. Non-empirical studies in contrast emphasise ideas and concepts (Alavi, et al., 1989). Of the ninety-one articles, eighty-four collect primary empirical data from SMEs. Table 7 gives an overview of the research strategies and data collection techniques employed in the eighty-four articles.

| *Strategy* | *Number* | *Technique* | *Quantity* |
|---|---|---|---|
| Survey | 37 | Questionnaire | 36 |
| | | Questionnaire and interviews | 1 |
| Case studies | 28 | Interviews | 21 |
| | | Questionnaire and interviews | 3 |
| | | Various techniques | 4 |
| Single case study | 3 | Participative | 2 |
| | | Other | 1 |
| Longitudinal case study | 1 | Interviews | 1 |
| Multi-method | 8 | Questionnaire and interviews | 8 |
| Action research | 3 | Single case study | 2 |
| | | Participative | 1 |
| Field studies | 3 | Ethnographic | 1 |
| | | Questionnaire | 1 |
| | | Interviews and observation | 1 |
| Others | 1 | Focus group | 1 |
| **Total** | 84 | | 84 |

**Table 7: Research strategies in IS-SME research**

The analysis confirms that surveys and case studies are the most frequently used research strategies in IS in SMEs research. Of the eighty-four studies, 44.04% use a survey strategy and 38.09% use case study strategies (including single and longitudinal case studies). In a survey research strategy a 'sample of subjects is drawn from a population and studied to make inferences about the population' (Collis & Hussey, 2003, p.66). Surveys are most often based on a questionnaire with structured interviews and observations building the less used components of this research strategy (Saunders, et al., 2000). All of the thirty-seven studies in the analysis use a questionnaire method except one, which uses both interviews and questionnaires. A survey research strategy is not used in this study as the underlying paradigm of this study is interpretive and little insight is obtained about the causes underlying a phenomenon under investigation (Galliers, 1992).

The second most common research strategy used in IS/SME research is case studies, including single and longitudinal studies. Most case studies employ the interview data

collection technique. The other common method is to combine the interview technique with other techniques such as questionnaires or participative methods.

Multi-method, action research and field study research strategies are less commonly used strategies. While multi-method and field study strategies have been employed pre 2000, the first action research study emerged in 2002.

In conclusion, surveys and case studies are the research strategies most extensively used in IS in SMEs research. Consequently, for IS in SME research the suggestion of Curran & Blackburn (2001) that case study is the predominant research strategy is not entirely correct. The findings from Table 7 confirm the results of Chen & Hirschheim (2004) that surveys with 41% and case studies with 36% are the most widely used research strategies in IS research. In terms of data collection techniques, the analysis verifies Myers' (1997) notion that interviews are the main method for data collection in IS case study research. The questionnaire technique is the main data collection method in survey research strategies. Observations, the third major technique proposed by Saunders et al. (2000) is rarely used in IS in SME research.

## 4.4 A case study research strategy

Based within the interpretive paradigm, various strategies, such as action research, grounded theory, and ethnography, are available but all except case studies are considered inappropriate for studying the diffusion of ASP in SMEs. A survey strategy, the most commonly used research strategy in IS-SME research besides case studies, is not suitable due to the underlying interpretive paradigm of this research and the little insight gained about the causes underlying a phenomenon under investigation (Galliers, 1992). Further, survey research methods are little suited for investigating reason for adopting an innovation and the consequences thereof (Rogers, 2003, p.440). In-depth case studies in contrast, are most useful when studying consequences.

As ASP is a contemporary phenomenon and studying ASP in SMEs means studying a contemporary phenomenon in its natural context, a case study approach is sensible (Benbasat, et al., 1987, Yin, 1994). The suitability of a case study research strategy is further underlined by the appropriateness of the case study method for research areas where examination and understanding of context are significant and how and why

questions are asked (Darke, et al., 1998, Yin, 1994). The research question posed in this thesis is 'How does an IS innovation, ASP, come to be adopted by, and diffused within, SMEs?' This research question is complemented by four research sub-questions that pose how and why questions. Thus a case study method is suitable according to Darke, et al. (1998) and Yin (1994).

Case studies are well suited for studying technology related innovations, such as ASP, in the organisational context (Darke, et al., 1998) and for studies where 'research and theory are at their early, formative stages' (Benbasat, et al., 1987, p.369) which is the case for ASP. The dynamic perspective of the case study approach will explain SME motives for adoption, the sequence of implementation and the consequences of ASP. A multiple case study research strategy is selected as it is considered most appropriate when exploring the emerging ASP phenomenon in the SME context. This exploratory (Marshall & Rossman, 1989), collective (Stake, 2000) case study approach will facilitate comprehensive understanding of ASP in SMEs and aid addressing the research questions. The conclusion therefore is that the case study research strategy offers the most promising route for acquiring knowledge about the emerging ASP phenomenon in an SME context.

### 4.4.1 Data collection technique

Semi-structured, in-depth interviews are the chosen method of data collection for this research. Interviews are purposeful discussions between two or more people (Saunders, et al., 2000) that produce qualitative evidence in the form of words as opposed to quantitative evidence that produces numbers. With respect to interpretive case studies, interviews are the primary data resource (Walsham, 1995b) that allow researchers to understand the meanings that people hold (Marshall & Rossman, 1989). The exploratory nature of the research underlines that in-depth interviews are a very suitable method for data collection (Marshall & Rossman, 1989, Robson, 2002). Interviews are one of six data collection techniques proposed for case study research besides documentation, archival records, direct observations, participant observation, and physical artefacts (Yin, 1994). As revealed in section 4.3 the interview technique is the preferred data collection method in IS-SMEs case study research. Additionally, in IS research, interviews and documentary materials are the main methods for data collection in case studies (Myers, 1997).

An interview can take a structured, semi-structured or unstructured format (Fontana & Frey, 2000, Robson, 2002, Saunders, et al., 2000). Structured interviews consist of standardised questions posed in a predetermined sequence (Bryman, 2001). Semi-structured interviews use the approach of structured interviews but the interviewee is given the freedom to discuss issues in any manner. The adaptability of the semi-structured interview therefore is a major advantage. A semi-structured format is chosen as ASP is an emerging phenomenon and thus theory is at an early, formative stage (Benbasat, et al., 1987). This semi-structured format allows the adaptation of questions to the specific context of the interviewee.

In diffusion research, survey interviews are widely use for gathering data. Yet, this method of data collection is not suitable for answering why questions as simple, direct questions usually posed in structured interviews are often 'inadequate to uncover motivations' (Rogers, 2003, p.116). In-depth interviews of a semi-structured form in contrast will aid the process model adopted for this research (Rogers, 2003). In terms of researching diffusion in organisations, the use of quantitative methods is further questioned by Rogers (2003, p. 408) as quantitative methods and analysis are less practical for uncovering processes and consequences.

Hitherto, this chapter discusses research paradigms, research strategies and data collection techniques and justifies a case study research strategy using a semi-structured in-depth interview technique. The following sections explain the selection of case study organisations and report the design of the interview schedule.

## 4.5 Research design

This section presents the actual design of the research including case firms, sampling strategy, design phase, interview schedule and data collection.

### 4.5.1 Case firms

One unique aspect of case study research in the social sciences is the selection of cases to study. As one cannot study intensively, and in-depth, all instances, events or persons, the researcher needs to determine a sampling strategy that is purposeful and

representative (Marshall & Rossman, 1989). This is normally done by choosing a setting, population and/or phenomenon of interest. A multiple cases approach requires the researcher to literally choose the cases to study in order to understand a phenomenon well (Stake, 2000). The sampling for this research therefore is not random but purposive (Stake, 2000): it is a 'convenient sample' (Levy, et al., 2002) focusing on a phenomenon, ASP, in a specific context, SMEs (Marshall & Rossman, 1989).

Sampling strategies applied in IS-SME research tend to define SME samples by using a quantitative SME definition (employees) matched to a geographic region or an industry; cross industry samples in geographic regions are also possible. This study examines the ASP phenomenon in UK SMEs. The sample comprises of SMEs with fewer than 250 employees, geographically located South of Manchester and West of London, including the city of London (south of 53° 30' N and east of 0° 0' W). The SMEs are chosen because they have adopted and use an ASP solution. There is no focus on a specific industry although four SMEs are theatres. SMEs were also chosen because they expressed their willingness to participate in the research and disclose details about the phenomenon in question. Twelve SMEs agreed to participate in the research. Table 8 explains the key characteristics of these twelve SMEs including name, industry, site, number of employees, ownership, legal status and category. Chapter five profiles each participating SME in detail.

| *Name* | *Industry* | *Location* | *No. of employees* | *Ownership* | *Legal status* | *Category* |
|---|---|---|---|---|---|---|
| AQO | Online retailer | Buckingham-shire | 1 full time, 1 long term temp, seasonal helpers | One sole owner | Limited Company | Micro firm |
| KBC | Sports services | Devon | Summer months 5 employees | Three owners | Limited company | Micro firm |
| PB | Business services | London | 3 | 9 directors | Limited liability partnership | Micro firm |
| TA | Computer services | West Wales | 8 | Fully owned by another business | Entity department | Micro firm |
| ZI | Drinks industry research | South West England | ~35 | 6 directors | Limited company | Small firm |
| MP | Pharma-ceuticals | West Wales | 11 | Privately owned, 2 major shareholders | Limited company | Small firm |
| EMT | Entertainment Theatre | Gloucester-shire | 30 full time and 17 part time | Borough Council owns building and land and leases it to the limited company which is the charity company | Company limited by guarantee & registered charity | Small firm |
| BLT | Entertainment Theatre | Midlands | ~50 full time ~50 part time | Trust, Council | Charitable trust | Medium firm |
| NWT | Entertainment Theatre | North Wales | ~ 50 full time and 25-30 part time/casual | Local authority | Funded by the local authority | Medium firm |
| TRP | Entertainment Theatre | South West England | ~ 100 plus casual staff | Registered charity | Registered non-profit making charity | Medium firm |
| FDL | Trading specialist ingredients | London | ~120 | Holding with one major shareholder | Private limited firm | Medium firm |
| AT | Business services | West Wales | ~100 | Enterprise agency run by a board of directors | Charity, non profit making organisation | Medium firm |

**Table 8: Case firm overview**

In total four micro firms, three small firms and five medium firms participated. Four SMEs are in the entertainment/theatre industry, two offer business services, one is an online retailer, one offers sports services, one trades specialist ingredients, one offers computer services, one produces pharmaceuticals, and one is engaged in drinks industry research. Thus the sample is based across a number of industries although four firms are theatres. Four SMEs are based in Wales (AT, TA, MP and NWT), three are based in South West England (KBC, ZI, EMT, and TRP), two are based in London (PB and FDL) and one is based in Buckinghamshire (AQO). Number of employees, the quantitative SME determinant besides geographical location, shows that the firms employ between one and one hundred twenty people. Whilst all SMEs employ people full time, Table 8 shows that many SMEs depend on part-time, seasonal and casual employees. The theatre industry in particular is heavily dependent on part time and

casual staff. Two of the micro firms, KBC and AQO, significantly depend on seasonal staff. Ownership and legal status vary widely across the case firms. The theatres have charitable status and are owned by local authority. The micro firms are limited companies (AQO, KBC), limited liability partnerships (PB) and entirely owned by another firm (TA). The small firms, except EMT theatre, are limited firms. Of the remaining medium-sized firms FDL is a holding and AT is a charitable enterprise agency.

### 4.5.2 Sampling strategy

Various methods to identify potential research participants were employed. These included internet searches, communication with ASP providers, and an exploitation of University sources. Most of the participating SMEs were identified using contacts at the University of Bath. Two of the SMEs were found on the internet (Figure 7). Only one ASP provider replied and although an interview with this provider was carried out, the provider did not agree to facilitate access to its customers. Thus access to SME participants was gained through using existing contacts and through developing new contacts (Saunders, et al., 2000).

Initial contact with the SMEs was in person on the phone. E-mails and letters did not prove to be a useful method of initial contact as the response rate was close to zero. AQO is the only firm initially contacted by e-mail that agreed to participate after a telephone conversation. Figure 7 shows the discovery mechanism that facilitated access to the case firms.

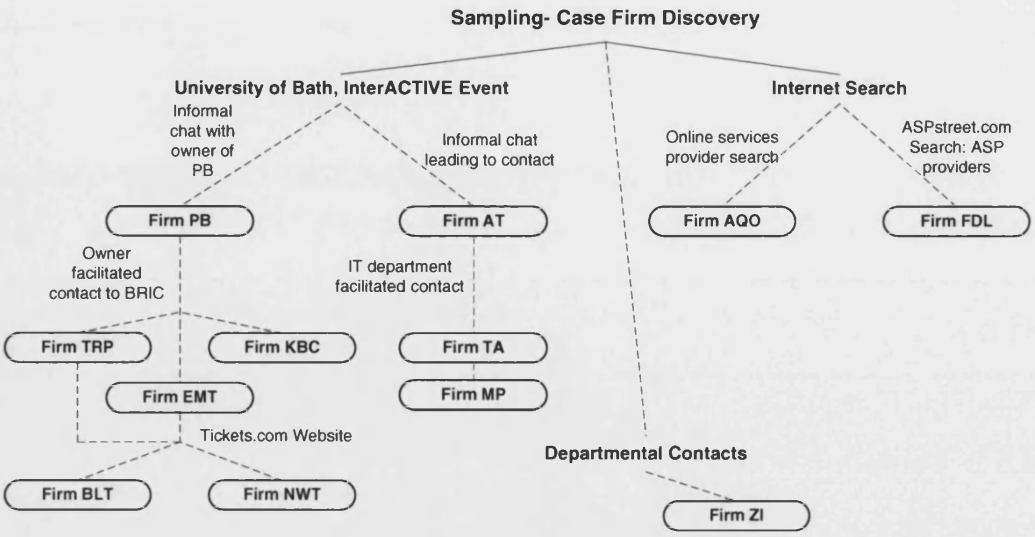


**Figure 7: Research sampling**

The most fruitful initial mechanism providing access to nine SMEs was an event at the University of Bath organised by the InterACTIVE group. At this event, the researcher met one of the owners of PB and had a conversation with a representative of a broadband pressure group in Wales. This person facilitated contact to AT. The interviewees at AT in turn facilitated contact to TA and MP, two firms based in the same town as AT. At the initial interview, the owner of PB pointed the researcher towards a government-sponsored project run by the Bristol Interactive Cluster (BRIC). The researcher contacted BRIC who pointed the researcher toward TRP, EMT and KBC. As both, EMT and TRP use an ASP-based e-ticketing solution, the researcher contacted other firms using tickets.com solutions. BLT and NWT agreed to participate. The second University of Bath mechanism was a departmental contact that facilitated access to ZI. The third mechanism was an in-depth internet search. Although exhaustive, this search only facilitated access to two firms: AQO and FDL. AQO contact details were found during an online services provider search. FDL was found through an ASP provider website identified on ASPstreet.com. Apart from AQO, who was originally contacted by e-mail, all firms that agreed to participate were initially contacted by telephone.

The benefits of a sampling strategy driven by the ability to get access to organisations are twofold: first, it enables the selection of cases that best meet the objective of the research which is to investigate the diffusion of ASP among SMEs. Second, it allows a snowball method to be used for identifying members of the SME population that have

adopted ASP solutions (Saunders, et al., 2000). This is particularly helpful considering that only few members of the SME population have actually adopted ASP-based solutions; and that it was very difficult identifying these members of the population. Conclusions are drawn from a purposeful choice of SMEs that have adopted ASP solutions, a strategy commonly used in case study research (Levy, et al., 2002, Saunders, et al., 2000). The key critique of this kind of sampling strategy is that it is not statistically representative of the total population; a critique frequently rallied by non-interpretive researchers. Yet, as this research is based in the interpretive paradigm, generalisations are not based on statistical grounds. In interpretive case study research, four types of generalisations are possible: 'the development of concepts, the generation of theory, the drawing of specific implications, and the contribution of rich insight' (Walsham, 1995a, p.79).

### 4.5.3 Design phase

At the early stages of this research, there was little empirical research on ASP in SMEs available which could guide the design of the study. While it was possible to draw upon literature sources in the disciplines of IS in SMEs and of innovation diffusion, the newness of the ASP phenomenon and the mass of mostly positive predictions about ASP in the business literature pointed towards the need to do a pilot study in preparation for the main investigation. The core objectives of this pilot were for the researcher to explore and learn about ASP; to develop and refine the interview schedule; to test different interviewing techniques; and to gather initial understanding from SMEs about ASP to determine the focus the study and refine the research question. This design phase was conducted between March 2002 and June 2003. It included fourteen interviews with thirteen key informants in different types of organisations including SMEs, ASP providers, university sources and not-for profit organisations. All interviews were additionally used to network and identify possible SME participants for the main investigation. Table 9 shows the date of the interviews, organisations, interviewee positions, and interview purpose.

| *Date* | *Organisation name* | *Organisation category* | *Interviewee position* | *Interview purpose* |
|---|---|---|---|---|
| 13/03/02 | WeSupply | ASP provider | Marketing Manager | Explore ASP |
| 13/05/02 | Colleagues Marketing | SME | Owner | Explore ASP, try face-to-face interview technique |
| 03/06/02 | University of Bath | University | Manager Interactive | Explore ASP |
| 26/06/02 | University of Bath | University | Executive MBA Student | Explore ASP |
| 30/10/02 | Broadband4Britain | Pressure group | Manager | Explore ASP and test parts of the interview schedule |
| 12/11/02 | PB | SME | Director | Explore ASP and test interview schedule |
| 18/11/02 | AT | SME | Project Manager | Interview |
| 25/11/02 | Bristol Interactive Cluster (BRIC) | Organisation | Technical Consultant | Explore ASP |
| 29/11/02 | AT | SME | Project Officer | Interview |
| 29/11/02 | AT | SME | Project Officer | Interview |
| 13/12/02 | Cardiff University | University | Broadband Centre Manager | Explore ASP |
| 27/03/03 | Greenwood Boxes | SME | Accountant | Test and refine interview schedule, refine face-to-face interviewing technique |
| 18/06/03 | Curvica | SME | Owner | Test parts of interview schedule, try telephone interview technique |
| 19/06/03 | COACS | SME | Owner | Test parts of interview schedule and refine interviewing technique |

**Table 9: Interviews performed during design phase**

The first interview was with the marketing manager of WeSupply, a specialist ASP provider. The core purpose of this interview, besides networking, was to explore the ASP innovation and become acquainted with the ASP-SME market. The market was at its very early stages then and, although very helpful, the provider declined access to their customers due to the sensitivity of the market. The second interview was with the owner of Colleagues Marketing, an SME based in Bath. This interview was used to test the first version of the interview schedule and explore ASP in SMEs. Whilst, as discovered during the interview, Colleagues was actually not using an ASP-based solution, the owner was very knowledgeable about ASP. The following two interviews were at the University of Bath. One interview was with the manager of InterACTIVE and one with an executive MBA student. Both interviews were solely used to network and gain knowledge about ASP. The following interview was with the manager of Broadband4Britain, a broadband pressure group. This interview was to explore ASP, to test parts of the interview schedule (the manager was also a director of an SME) and to network. This manager facilitated access to the case firm AT. Following these initial five interviews, the first version of the interview schedule was ready. During November 2002, the first interviews with PB and AT were carried out using the first version of the interview schedule. The interview with the director of PB was additionally used to

explore ASP. In total five interviews were carried out in November 2002. One interview was with PB, three with AT and one with the technical consultant of Bristol Interactive Cluster (BRIC). The director of PB had facilitated contact with BRIC. The purpose of this interview was to explore ASP and network. The last interview in 2002 was in December with the manager of the broadband centre at Cardiff University. This interview was to explore ASP further and to network.

Following these initial interviews in 2002, three interviews were carried out in 2003 to finalise the interview schedule after changes to the original research proposal. Additionally, these interviews were used to refine interview techniques. The first interview was in March 2003 with the accountant of Greenwood Boxes, an SME using an ASP-based website service. The refined interview schedule was tested and face-to-face interviewing technique was improved. Further access to this SME was declined. The interviews with the SMEs Curvica and COACS were used to enhance interviewing skills and to test parts of the interview schedule. Whereas all previous interviews were in the face-to-face form, the interview with Curvica was over the telephone. As none of these SMEs use ASP-based solutions, they use other software services instead, only parts of the interview schedule were tested.

Throughout the design phase, the interview schedule was developed, tested and refined. This interview schedule is presented in the following section.

### 4.5.4 Interview schedule

The design of the interview schedule is based on the research sub-questions. These research sub-questions are derived from the various organisational innovation diffusion phases and the main research question 'How does an IS innovation, ASP, come to be adopted by, and diffused within, SMEs?' This research question is produced to address the research objective which is 'to investigate the diffusion of ASP among SMEs'. Figure 8 lays out the link between research objective, research question and research sub-questions.

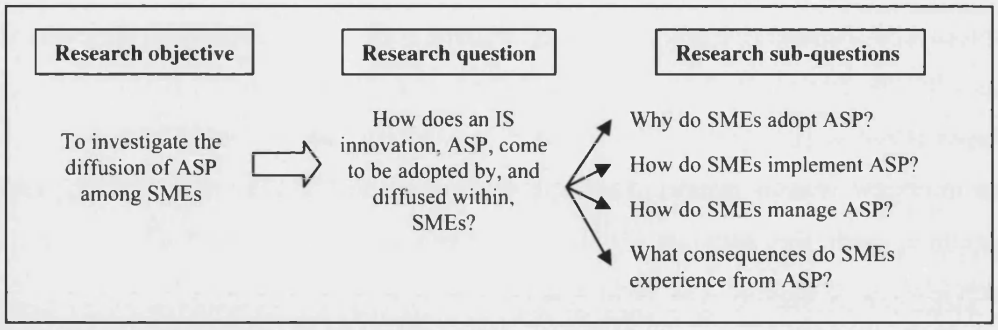


**Figure 8: Link research purpose, question and sub-questions**

In terms of sequence of questions, the interview schedule is structured in accordance with the research sub-questions. In line with the interpretive nature of the research and the lack of evidence from SMEs, open-ended questions were posed to allow issues (not visible in the literature) to surface. Corresponding to the semi-structured format of the interview schedule the questions posed act as guidance for the interviewer and enable in-depth discussion about surfacing issues. Before the questions about ASP adoption, implementation and consequences were posed to the interviewees, background information about the SME was collected. Figure 9 shows background questions posed to the SMEs. The questions ask for a business profile, location of the business, legal status, ownership, number of employees and customers.

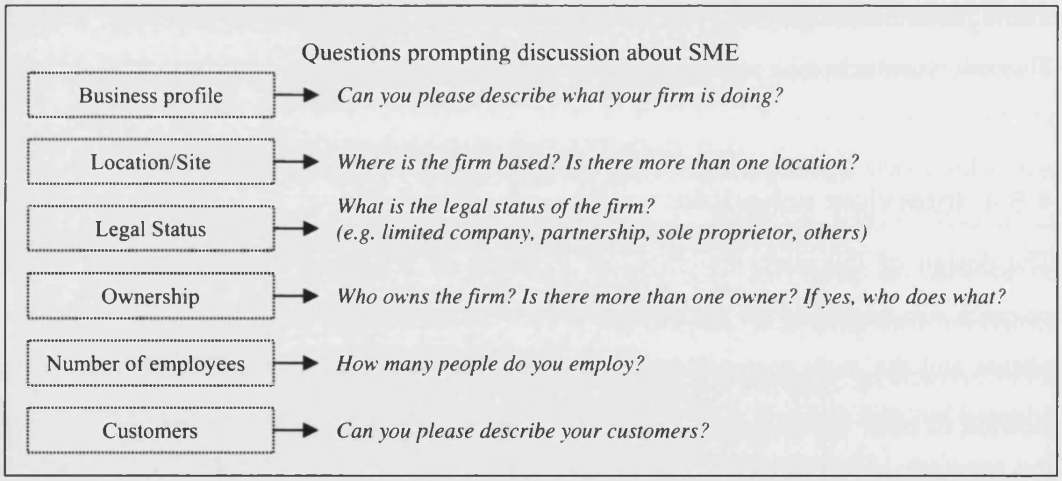


**Figure 9: Questions posed to gather information about SMEs**

As ASP is an IS innovation, the second group of questions discusses the IS structure of the SME. These questions discuss capabilities, hardware, software and telecommunications at the SMEs. Figure 10 shows the questions posed to prompt the discussion about the IS structure.

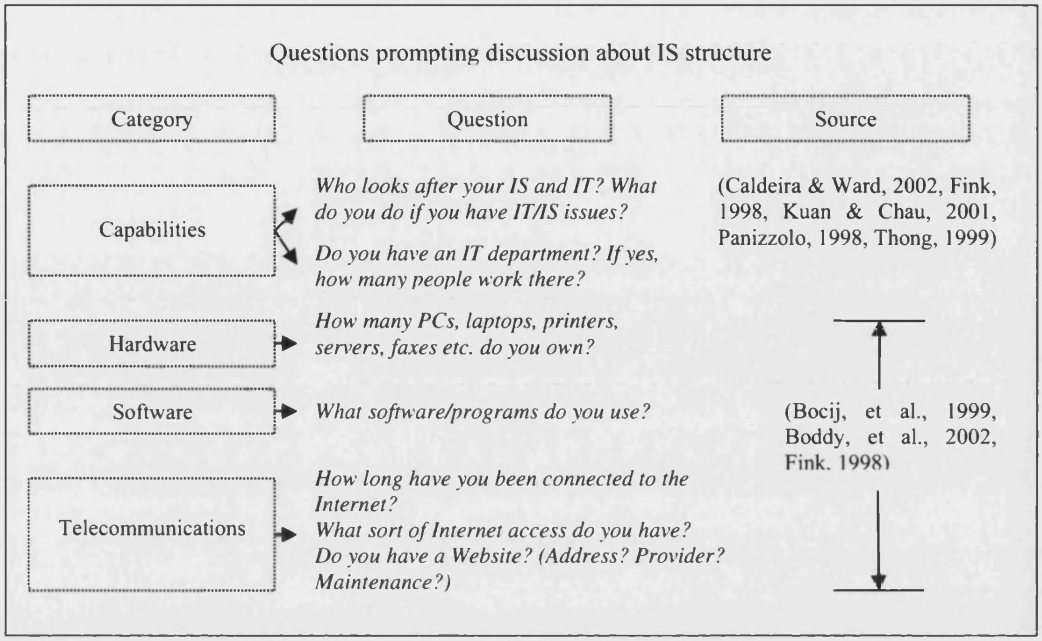


**Figure 10: Questions posed to prompt discussion about IS structure**

The third, a priori issue to be discussed with the SME is the ASP solution. Figure 11 shows the questions posed to the interviewees regarding the ASP solution. These questions enquire about the name of the solution, the provider, the purpose of the solution, adoption start, access, cost, users and management.

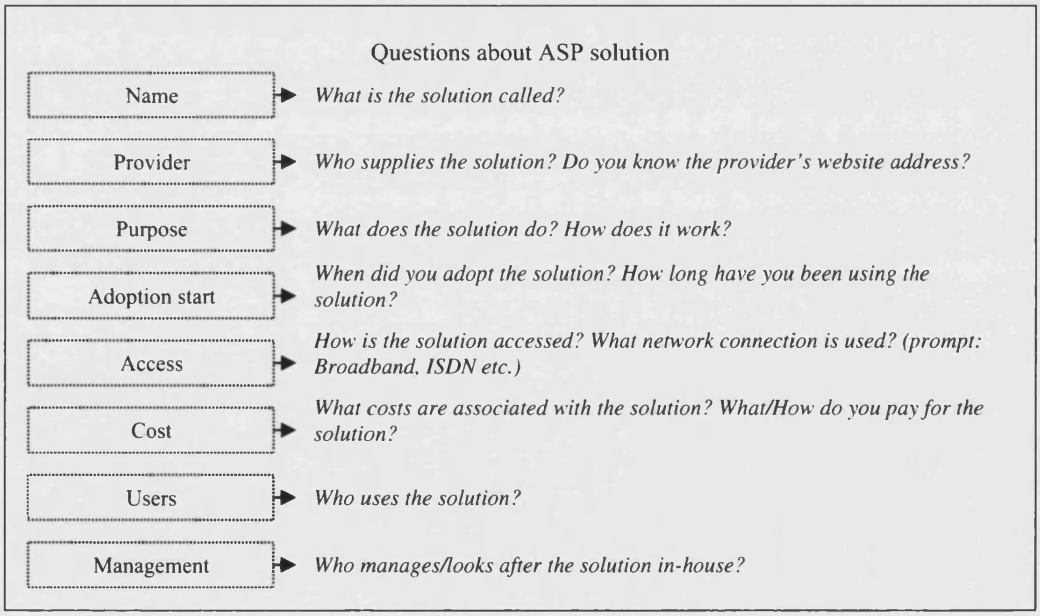


**Figure 11: Questions posed to gather information about ASP solutions**

After discussing the SME, the IS structure and the ASP solution with the interviewee, questions relating to the adoption phases prompted the discussion about the adoption of the ASP solution in the SMEs. Figure 12 shows the core questions posed. These

questions address the first research sub-question, which asks 'why do SMEs adopt ASP?' The questions enquire about application adoption reason, motive for using an ASP-based solution, the person responsible for the adoption and reasons for using a specific provider and adopting a specific solution.

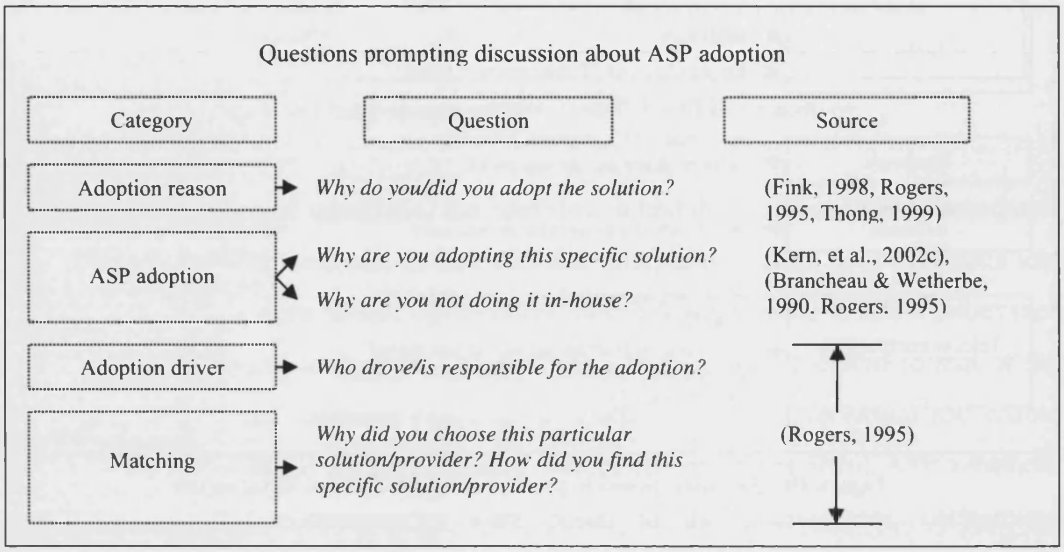


**Figure 12: Questions posed to prompt discussion about ASP adoption**

In accordance with the diffusion phases, the questions following the discussion about adoption were posed to enquire about the implementation phase. These questions were posed to address the second research sub-question 'how do SMEs implement ASP?' The questions ask about implementation process, timescale, training and integration. Figure 13 shows these questions posed to prompt the discussion about ASP implementation.

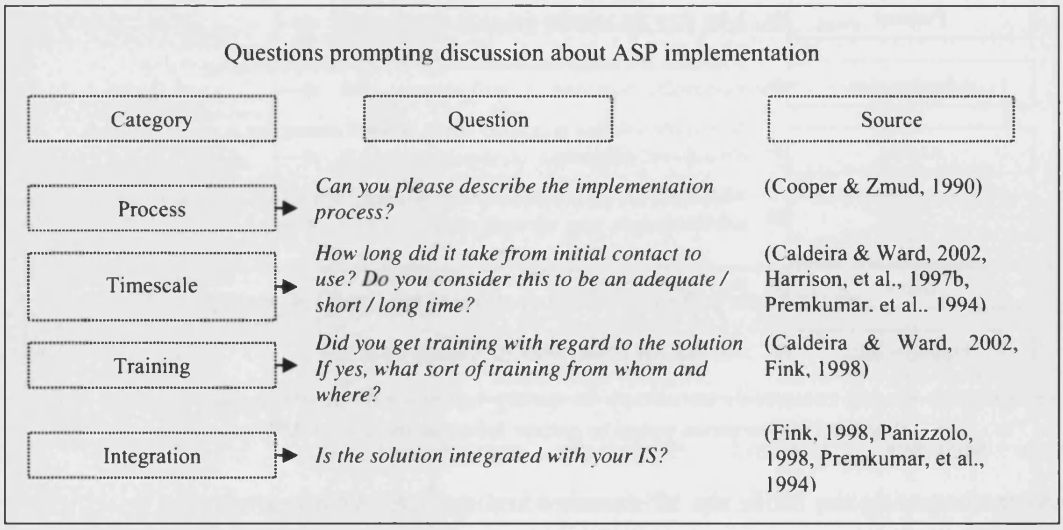


**Figure 13: Questions about ASP implementation**

The third research sub-question asks 'how do SMEs manage ASP and what consequences do SMEs face from adopting and implementing ASP?' Thus the third part of the interview schedule enquires about management of the solution and its consequences. Questions posed ask for benefits, drawbacks, support, satisfaction, risks and influences. Figure 14 shows the core questions posed.

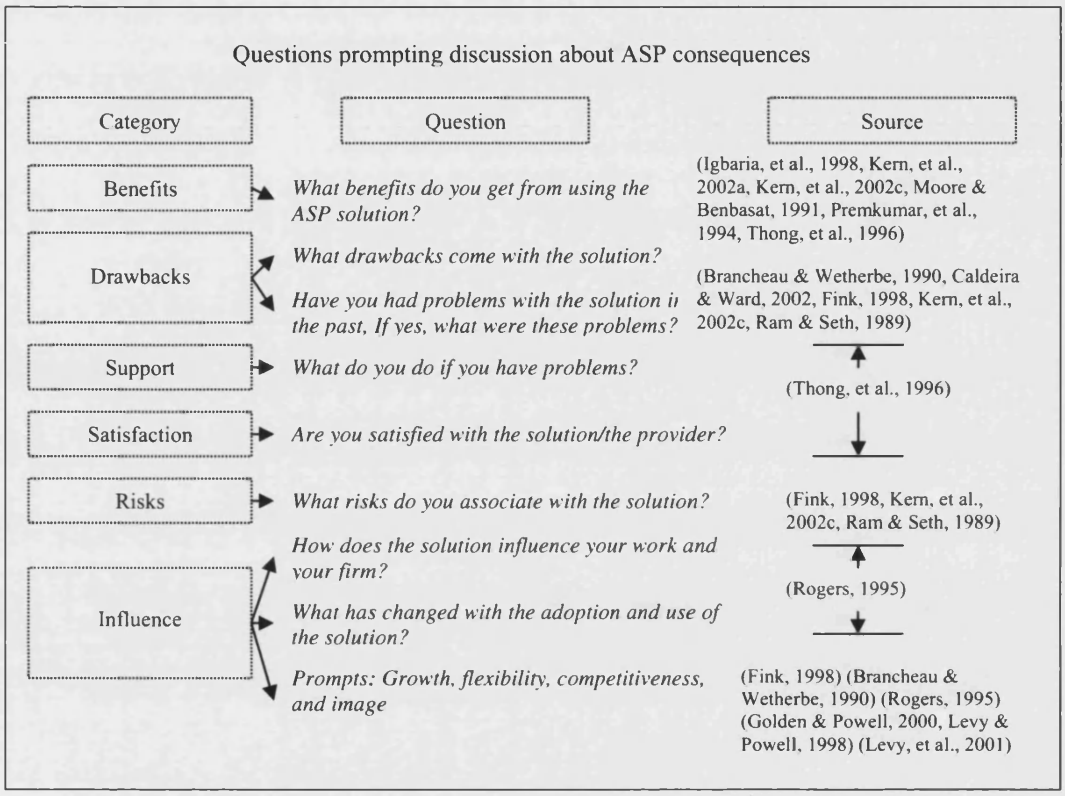


**Figure 14: Questions posed to prompt discussion about ASP operation and consequences**

The closing stages of the interview were used to get a summary of the interviewee's experiences with the ASP solution. Figure 15 shows the questions posed to close the interviews. These questions ask for hidden and overlooked issues and ask the interviewee for a summary of their experiences with the ASP solution.

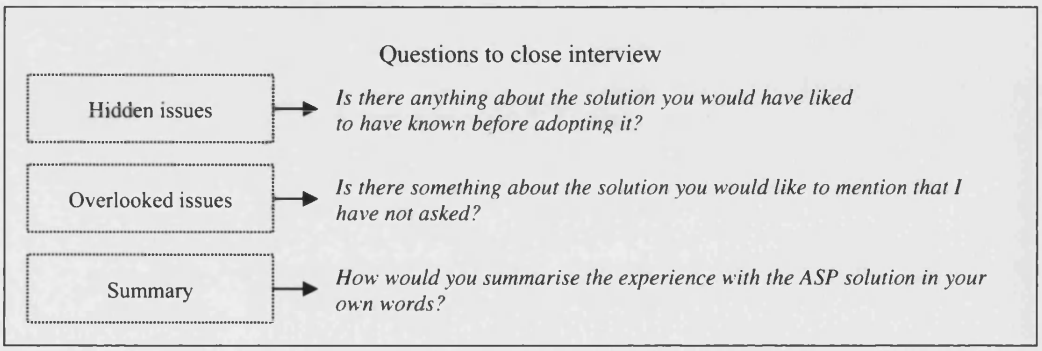


**Figure 15: Questions to close interview**

In conclusion, Figures 8 to 15 represent the interview schedule. This schedule follows a logic that is derived from the phases of the diffusion process. The schedule is divided into three core segments. The first part enquires about the SME (Figure 9), the IS structure of the SME (Figure 10) and the ASP solution (Figure 11). The second segment investigates the diffusion process: ASP adoption (Figure 12), implementation (Figure 13) and consequences (Figure 14). The third segment (Figure 15) closes the interview asking for a summary of the interviewees experience with ASP and missing elements.

### 4.5.5 Data collection

Since ASP is studied in its natural context, data collection primarily took place in the case firms, at locations convenient for the interviewees. All of the participating firms were visited by the researcher at least once. The main method of data collection was by means of in-depth, face-to-face interviews which were complemented by telephone interviews. In total thirty-seven interviews were conducted (Table 10). Interviews were conducted with SME owner-managers, and people who use, manage and deal with the ASP solution. In-house interview locations chosen by interviewees included their own offices as well as favoured domestic meeting areas. All the interviews were tape recorded and transcribed thereafter. Thirty-one interviews were face-to-face and six interviews were conducted over the telephone. The telephone interviews were mainly second interviews except NWT-3. These follow-up interviews were tailored to the responses from the first interview and mainly seek clarification and development. The telephone interviews further aimed to explore changes that happened since the initial interviews took place. Table 10 structures the interviews according to the case firms. Due to the nature of a micro firm with fewer than ten employees, the number of interviews is limited in AQO, KBC, PB and TA. In the small and medium-sized firms interviews were conducted with as many people affected by the solution as possible. In MP, one person is solely responsible and dealing with the solution, hence only this person was interviewed.

| *SME* | *Code* | *Interviewee* | *Interviewee-ASP relationship* | *Date* | *Interview location* | *Interview Type* |
|---|---|---|---|---|---|---|
| AQO | AQO-1 | Owner | Adoption driver & solution manager | 11/07/03 | Firm's office | Face-to-face |
| | AQO-2 | Owner | | 20/10/03 | - | Telephone |
| KBC | KBC-1 | Owner | Adoption driver & solution manager | 05/09/03 | Firm's shop | Face-to-face |
| | KBC-2 | Owner | | 10/10/03 | Firm's shop | Face-to-face |
| PB | PB-1 | Director | Adoption driver & solution manager | 12/11/02 | Director's home office | Face-to-face |
| | PB-2 | | | 11/08/03 | University restaurant | Face-to-face |
| | PB-3 | Project Manager | User | 08/09/03 | Firm's office | Face-to-face |
| | PB-4 | Director | User | 08/09/03 | Firm's office | Face-to-face |
| TA | TA-1 | Manager | Adoption driver & solution manager | 27/06/03 | Firm's meeting room | Face-to-face |
| | TA-2 | | | 26/08/03 | Firm's meeting room | Face-to-face |
| ZI | ZI-1 | Research & Development Director | User | 03/10/03 | User's office | Face-to-face |
| | ZI-2 | IT Systems Manager | Solution manager | 15/10/03 | Manager's office | Face-to-face |
| | ZI-3 | Research & Development Director | User | 18/11/03 | - | Telephone |
| | ZI-4 | IT Systems Manager | Solution manager | 18/11/03 | - | Telephone |
| MP | MP-1 | Sales and Marketing | Solely responsible | 26/08/03 | Firm's meeting room | Face-to-face |
| EMT | EMT-1 | General Manager | Adoption driver | 11/09/03 | Manager's office | Face-to-face |
| | EMT-2 | Box Office Manager | Solution manager | 24/10/03 | Manager's office | Face-to-face |
| | EMT-3 | Marketing Manager | Adoption driver | 24/10/03 | In-house restaurant | Face-to-face |
| BLT | BLT-1 | Marketing Audience Research | Solution manager | 24/11/03 | In-house eating area | Face-to-face |
| | BLT-2 | Box Office Manager | Day-to day solution manager | 24/11/03 | Manager's office | Face-to-face |
| | BLT-3 | Marketing Audience Research | Solution manager | 12/02/04 | - | Telephone |
| NWT | NWT-1 | Marketing Manager | Adoption driver & solution manager | 04/02/04 | In-house eating area | Face-to-face |
| | NWT-2 | Box Office Manager | Day-to-day solution manager | 04/02/04 | In-house eating area | Face-to-face |
| | NWT-3 | Finance Officer | Deals with solution finance side | 10/02/04 | - | Telephone |
| TRP | TRP-1 | Direct Marketing | User | 17/10/03 | In-house eating area | Face-to-face |
| | TRP-2 | PR | User | 17/10/03 | In-house eating area | Face-to-face |
| | TRP-3 | Systems Co-ordinator | Adoption driver & solution manager | 26/11/03 | In-house meeting area | Face-to-face |
| | TRP-4 | IT | Adoption driver & solution manager | 26/11/03 | In-house meeting area | Face-to-face |
| | TRP-5 | Systems Co-ordinator | Adoption driver & solution manager | 13/02/04 | - | Telephone |
| FDL | FDL-1 | Distribution Manager F&B Division | Adoption driver & solution manager | 14/07/03 | Firm's meeting room | Face-to-face |
| | FDL-2 | Distribution Officer F&B Division | User | 25/09/03 | Firm's meeting room | Face-to-face |
| | FDL-3 | Distribution Manager F&B Division | Adoption driver & solution manager | 25/09/03 | Firm's meeting room | Face-to-face |

| | | | | | | |
|---|---|---|---|---|---|---|
| AT | AT-1 | Project Manager | Adoption driver | 18/11/02 | Restaurant | Face-to-face |
| | AT-2 | Project Officer | Solution manager | 29/11/02 | Firm's meeting room | Face-to-face |
| | AT-3 | Marketing & Administration Officer | User | 29/11/02 | Firm's meeting room | Face-to-face |
| | AT-4 | Project Officer | Solution manager | 27/06/03 | Manager's office | Face-to-face |
| | AT-5 | Marketing & Administration Officer | User | 27/06/03 | User's office | Face-to-face |

**Table 10: Record of interviews**

While all firms were physically visited at least once, three of the face-to-face interviews took place outside the firms: PB-1 was done at the director's home office as this is where the interviewee works most of the time. This interview therefore is within the natural context of the firm. PB-2 took place at the University upon the interviewee's request who wanted to visit the campus for a change. AT-1 took place in the public space of a restaurant as, at the time of the interview, the interviewee had left the organisation to work for a government agency. PB-2 and AT-1 were not undertaken in the immediate natural context of the firm. This data collection happened in a context as natural as possible, as determined by the participant. At both firms, other interviews took place at the firm premises, which is why it was possible to gain understanding about ASP in the SME context.

In addition to responding to the questions, participants at every firm took the time to physically show the ASP solution to the researcher and explain how it works. The observations made during the explanations helped to foster understanding about how the ASP solutions function in their natural context and how they are integrated within the firms. While the action of looking at the solution is an observation, it is regarded to be part of the interview collection method. It is not an observation in the sense of being a separate data collection technique where the objective is to study people's actions and behaviour (Saunders, et al., 2000). The researcher further took the opportunity to go on a guided tour around each company's site, given by AQO-1, KBC-1, PB-3, TA-1, ZI-2, MP-1, EMT-3, BLT-1, NWT-1, TRP-3, FDL-1, and AT-2. These tours helped to shape the researcher's understanding about the firm. Interviews are the sole data collection method used in the research and solution observations and company tours supplement the interviews.

## 4.6 Qualitative data analysis

Qualitative research approaches produce data in the form of words rather than numbers. These words are analysed by methods other than statistics and quantification (Strauss & Corbin, 1990): qualitative data analysis is the process of organising and reducing data to bring meaning to it (Marshall & Rossman, 1989). Good qualitative data analysis consists of three activities: data reduction, data display and conclusion drawing/verification (Miles & Huberman, 1994). Data reduction refers to the 'process of selecting, simplifying, abstracting, and transforming the data that appear in written-up field notes or transcriptions (p.10). Data display refers to 'an organised, compressed assembly of information that permits conclusion drawing and action' (p.11). Conclusions emerge vaguely during the data collection, manifesting once all the data is collected and verification happens as the analysis proceeds. The verification further includes testing the emerging conclusions for their validity. Yin (1994) suggests that analysing case study evidence is particularly difficult with reference to external validity. External validity refers to the generalisability of the study and is an area of weakness in case study research (Darke, et al., 1998). A multiple case study design, following replication theory, however does improve generalisability. Replication theory refers to the predictability of similar results and/or contrasting results due to predictable reasons (Yin, 1994). Frequent criticism of using qualitative data include the 'labour intensiveness (and extensiveness over months or years) of data collection, frequent data overload, the distinct possibility of researcher bias, the time demands of processing and coding data, the adequacy of sampling when only a few cases can be managed, the generalisability of findings, the credibility and quality of conclusions, and their utility in the world of policy and action' (Miles & Huberman, 1994, p.2).

### 4.6.1 Data analysis procedure

During the initial stages of the analysis the conceptual framework significantly informed the analysis process. Data collected in the interviews was organised into case summaries which were structured according to the stages displayed in the conceptual framework. As the analysis progressed, and understanding about the different stages emerged, the conceptual framework changed and finally resulted in a model of the IS innovation process for SMEs (Figure 30). This, as well as other conclusions emerged from a systematic process of data analysis which is presented in Figure 16.

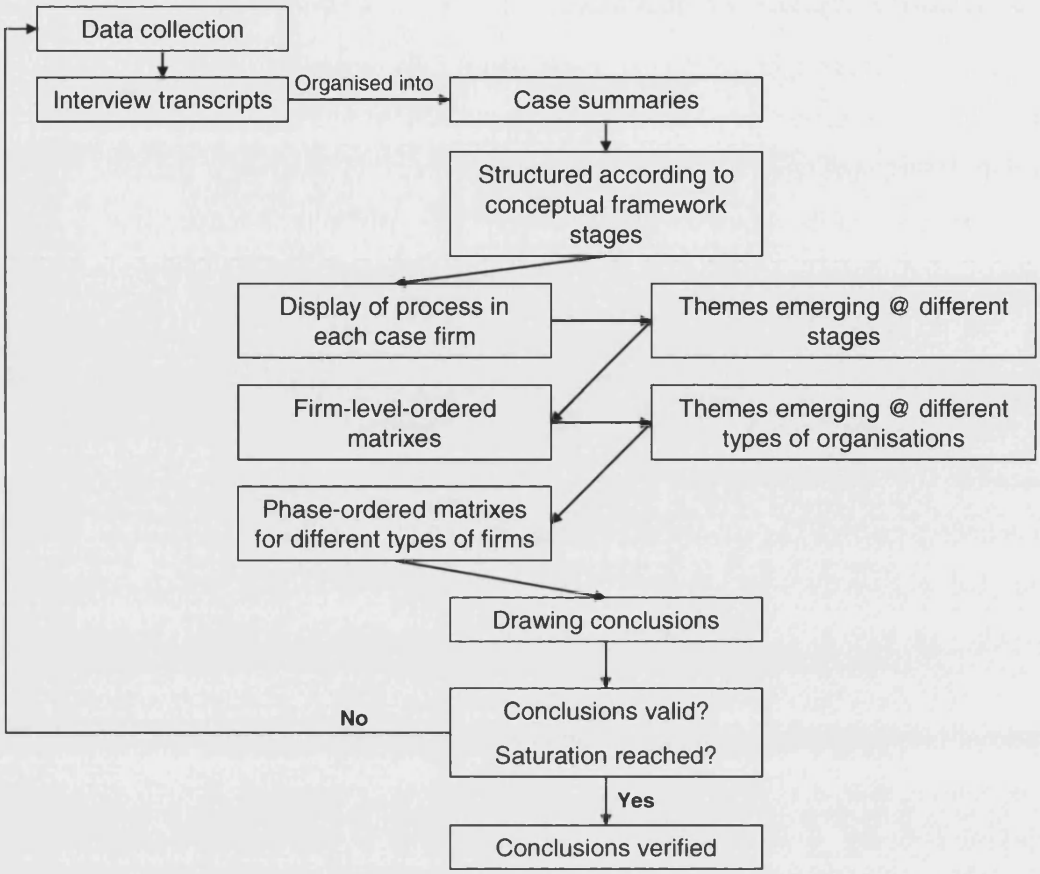


**Figure 16: Data analysis process**

**(adapted from Miles and Huberman, 1994, Marshall and Rossman, 1989)**

The data analysis process for this research consisted of reducing, organising and displaying data (Marshall & Rossman, 1989, Miles & Huberman, 1994) to allow conclusions to be drawn. The different activities were sequential, with the previous data reduction and display informing the following reduction and display. The initial steps of transcribing the interviews and structuring the emerging themes according to the conceptual framework in the case summaries were straight forward. For these activities, the quotes from the interviews were coded into emerging themes for each diffusion stage. The themes from the various interviews were then transferred into the case summary word documents. The case summaries are compactly displayed in process figures modelled for each firm. The themes from the within-case process analyses were then transferred to firm-level ordered matrixes organised into micro, small and medium-sized firms. The within-case data, the matrixes, and the emerging themes are discussed in chapters six, seven and eight. The next step in the analysis was to further reduce the data by mapping all the emerging themes across all the cases studied. This analysis is

structured according to the emerging phases of the diffusion process. From this final step of reduction and display in the analysis (chapter nine), conclusions at an SME level are drawn.

The process of data analysis includes satisfying issues of saturation and validation. These activities are carried out to verify the conclusions. Data collection ceased when theoretical saturation (Glaser & Strauss, 1967) was reached: no particular new insights or perspectives were forthcoming (Bauer & Gaskell, 2000) and many observations had been seen before (Glaser & Strauss, 1967). This was the case when no major new themes were emerging in the various data display and reduction steps. The focus of the saturation is on major new themes as the analysis is limited by a sampling strategy driven by access. While data collection in different firms took place both, simultaneously and consecutively, the themes emerging in the last couple of cases did not lead to the discovery of major new themes and insights. Further, many of the findings emerging the last couple of cases had been observed in preceding cases. This confirmed the understanding that saturation was reached and as a result data collection was ended.

The other activity to verify conclusions is to establish the credibility of the research by testing its validity. This is discussed in the following sections.

### 4.6.2 Research credibility

Various instruments enhance the credibility of case study research. In the social sciences these include construct validity, internal validity, external validity and reliability (Yin, 1994). Construct validity refers to 'establishing correct operational measures for the concepts being studied' (p.33) which multiple sources of evidence, evidence chain and review by key informants can address. Internal validity, applicable only in explanatory case studies, establishes a causal relationship and can be addressed through pattern-matching, explanation building and time series analysis. External validity is concerned with generalisability of a study's finding and can be addressed through replication logic in multiple case studies. The final test, reliability, is concerned with the repeatability of a study and can be addressed through case study schedule and database (Yin, 1994).

### 4.6.3 Establishing research credibility

The adoption of a multiple case study design and the development and testing of a framework, including an interview schedule, satisfies generalisability concerns related to this study. Multiple cases ensure that common patterns are identified rather than to generalise from what might be chance occurrences (Eisenhardt, 1989). This multiple cases strategy combined with a data collection period spanning two years and the strategy of interviewing different people as well as the same people after a period of time is the core method employed to prevent drawing conclusions from snapshots of situations. The similar emerging themes in different cases at different times are evidence that the ASP situations in the SMEs are not snapshots which may change quickly. Besides validity and generalisability issues, case studies are commonly plagued by reliability concerns such as different interpretations of events by different researchers (Galliers, 1992, Yin, 1994). The case study protocol including an interview schedule is essential when using a multiple case design (Yin, 1994) and is the major tactic in increasing the reliability of this research. The interview schedule, shaped during the design phase, was used to gather data. The data collected during in-depth interviews was initially taped, then transcribed and finally summarised in case summaries. These case summaries are the outcome of the data reduction process (Miles & Huberman, 1994). Case ordered matrixes are used to display the data which permits conclusion drawing and verification.

### 4.6.4 Biases and limitations of method

One of the frequent criticisms of qualitative research is the distinct possibility of researcher bias (Miles & Huberman, 1994). Interpretive research in particular 'begins and ends with the biography and self of the researcher' (Denzin, 1989). Qualitative researchers therefore need to acknowledge that their personal beliefs and values influence every aspect of their research including the method employed and their interpretation of findings (Mehra, 2002). The aim of the interview method employed in this study is to obtain information from the interviewee about ASP in their organisation. This leads to an additional source of potential bias: the information collected from the interviewee is open to inaccuracy concerns and is influenced by previous experiences and presuppositions of the interviewee (Ackroyd & Hughes, 1992). To minimise this potential bias, data was collected from different informants whenever possible. This strategy enables the researcher to uncover key informant disparities with regards to the

ASP application. The analysis included the multiple voices which lead to sometimes competing themes emerging in the same firm. One example is PB, where one of the directors interviewed (the person responsible for the adoption) had a different view on some aspects of the application than did one of the employees of the firm. The director's view was more benefit-oriented than the employee's view. During the analysis it emerged that these diverging micro views converged on a macro level, as both interviewees agreed on the different diffusion stages and the overall benefit categories. In the firms where interviews were only possible with one person, this issue could not be eradicated fully but is hereby acknowledged.

To further minimise bias, a second interview was done in all but one firm to find out whether the interviewee's position had changed over time. In none of the cases had it changed considerably. The researcher could not identify significant disparities on a macro level. This understanding, however, is impaired by the researcher's own views and interpretations. To minimise this kind of bias, the researcher employed the rigorous systematic procedure of developing a conceptual framework which guided the research throughout the various research phases over time. This framework caters for a difference in research philosophy as Rogers' original model of the innovation process in organisations emerges from a positivist approach yet, this research is of an interpretive nature. The emphasis is on guidance and not on substantiation. This strategy of allowing for rival or contrary findings to emerge (Yin, 1994) while specifically searching for disconfirming themes (Miles & Huberman, 1994) in the interview data is a key method employed to reduce researcher bias. The core approach was to produce transcripts of the interviews recorded. These transcripts were used to explore the interviewee's answers in depth and check for emerging disconfirming themes and other themes not picked up during the actual interview. In hindsight, few disconfirming themes emerged but even more themes emerged from the transcripts which were not originally picked up in the interviews.

### 4.6.5 Taking account of Rogers weaknesses in the analysis

As identified in section 2.3.2 Roger's innovation diffusion theory is not without shortcomings. The core shortcomings of the research domain according to Fichman (2004) are that research is pro-innovation biased assuming that innovations are beneficial; adopter categories are unproven; studies rarely consider outcomes or benefits

of IT innovations; the theory does not allow for complex interactions to emerge; and in an organisational context decisions are overwhelmingly organisational rather than individual. Fichman (2004) by enlarge criticises the explanatory power of Rogers' theories with these shortcomings but this research is exploratory using a qualitative data collection technique which allows for explanations to emerge. Most applicable of Fichman's critiques to this research is the individual bias which is also a critique raised by Larsen (2001). The ASP decisions in the firms were made by entrepreneurs and owner-managers for the organisation. These decisions by individuals were made on behalf of the organisations. One key characteristic of SMEs is this dominance of owner-managers (Section 2.1.2) which is why this critique is minor for the analysis which is based on the interpretations of the individuals involved. The research did further include interviews with non-decision makers in SMEs and the themes emerging from these interviews are not markedly different to the ones emerging from the interviews with the decision makers. The remaining critiques of Fichman do not concern the aspects of diffusion research relevant for this study. It does, for example, not study the adopter categories that Fichman (2004) considers unproven. Other critiques by Larsen (2001) are pro-innovation bias, narrow scope, and the theory's disparity to real organisational diffusion management. By studying ASP in its natural context, i.e. the SME, this study makes conclusions about the real organisational diffusion management. The conclusions drawn in Figure 29 illustrate this gap between Rogers' theory and the findings emerging from the natural context. The model presented in Figure 29/30 therefore is a core contribution to theory. Pro-innovation bias is addressed by specifically allowing for rival and contrary findings to emerge (Yin, 1994). As the findings illustrate, SMEs identify several areas where dissatisfaction with the ASP solutions exist. The narrow scope issue is not relevant as the analysis focuses on ASP and the meanings that respondents in SMEs hold about ASP rather than observing human behaviour for which the scope of the theory would be too narrow according to Larsen (2001).

## 4.7 Chapter summary

This chapter reviews research paradigms and discusses research strategies and techniques associated with the interpretive paradigm. The chapter justifies a case-study research strategy using an in-depth interview data collection technique. In addition, the chapter details the research design: it introduces the case firms, presents the sampling strategy employed, describes the research design phase, portrays the interview schedule

and describes the data collection process. The chapter concludes with a discussion about qualitative data analysis and establishes case study research credibility: it establishes a data analysis audit trail; it verifies the credibility of the research; it discusses biases and limitations and it takes account of Rogers' weaknesses in the analysis process.

# 5 CHAPTER FIVE: SME PROFILES

The phrase SME research immediately draws attention to the difficulties of defining SMEs discussed in chapter two. Whilst there is no best way of classifying the many different types of SMEs, the SME definition most appropriate depends on the context of each individual study. For the purposes of this research the definition and categories of the European Commission (2003) are most appropriate as the participating SMEs are all based in the UK which is a member of the European Union. This definition provides two key measurements for SME size: employment and turnover. Yet, whilst these are the two core measurements, the analysis of empirical studies on IS in SME presented in section 4.3 uncovers that the staff number criterion is most important and thus key criterion for defining SMEs for research purposes, just as advocated by the European Commission (2003). Table 11 presents the studies reviewed for this analysis and the SME definitions used. As the research strategy employed in this research is case studies, definitions used in case study research are most relevant. Hence, Table 11 presents definitions from case study strategies identified in section 4.3.

| *Reference* | *SME definition* |
|---|---|
| (Iacovou & Benbasat, 1995) | Employees <200 |
| (Cragg & Zinatelli, 1995) | Employees<100 |
| (Scott, et al., 1996) | 25<employees<300 |
| (Zinatelli, et al., 1996) | Employees<100 |
| (Mitchell, et al., 1997) | 7<employees<840 |
| (Lefebvre, et al., 1997) | Employees<200, firm independent |
| (Panizzolo, 1998) | EU norms employees (most 0-100), sales and production volume |
| | 24<employees<285, £1.6m<turnover <£12m |
| (Ballantine, et al., 1998) | - |
| (Levy & Powell, 1998) | 24<employees<285 |
| (McGregor & Gomes, 1999) | New Zealand government employment definition Small: 0-49, Medium: 50-99, Large: 100+ |
| (Huerta & Sanchez, 1999) | 158<employees<420 |
| (Levy, et al., 1999) | - |
| (Whitley, 1999) | Entrepreneurial organisation |
| (Poon & Swatman, 1999) | Employees<20, non-public organisations |
| (Riemenschneider & Mykytyn, 2000) | US Small Business Administration definition: employees < 500 |
| (Levy & Powell, 2000) | [Old] EU employment definition Micro: 0-9, Small:10-99, Medium: 100-499 |
| (Duhan, et al., 2001) | ~40 employees |
| (Mehrtens, et al., 2001) | Employees <200 |
| (Caldeira & Ward, 2002) | 58≤ employees ≤ 450 |
| (Cragg, 2002) | 20<employees<100, only independent firms |
| (Levy, et al., 2002) | Employees<500 |
| (Caldeira & Ward, 2003) | 158<employees<420 |
| (Levy, et al., 2003) | EU employment definition: 10-250 employees |
| (Piscitello & Sgobbi, 2004) | 10<employees<110 |
| (Houghton & Winklhofer, 2004) | DTI definition for UK SMEs Employees <250 |
| (Bruque-Camara, et al., 2004) | Mean of 136 workers and Euro 49.99 millions sales p.a. |
| (MacKay, et al., 2004) | Independent, employees <=100 |
| (Liang & Xue, 2004) | Qualitative definition: three life cycle stages: start-up, development and expansion SMEs |
| (Gengatharen & Standing, 2005) | Employees<20 |
| (Carayannopoulos, 2005) | Employees=270, turnover USD 70.5 million |
| (Fillis & Wagner, 2005) | [Old] DTI employment definition Micro: 0-9, Small:10-99, Medium: 100-499 |

**Table 11: SME definitions used in case study research**

The majority of the thirty-two case study studies use the size of the business indicated by number of employees for defining SMEs. The lower and upper limits in employment terms vary considerably according to the geographical position of the SME. These employment margins often mimic government definitions endorsed in this geographical location. Financial measurements such as turnover or fixed assets are less often used for defining SMEs. Even fewer scholars use the independence criteria for defining SMEs. While SMEs can easily be defined in terms of quantitative measures such as size and turnover, the key problem with quantitative definitions is that they are too all-embracing (Storey, 1994). The key problem with qualitative definitions however is that they defy practical application (Burns, 2001). Only one study (Liang & Xue, 2004) specifically uses a qualitative definition for SMEs. Most scholars doing case study research address the problematic SME definition issue by applying a purposeful sampling strategy: they

choose to study a setting, population and/or phenomenon of interest. This approach is well documented in the literature (Marshall & Rossman, 1989, Stake, 2000) and, as the analysis uncovers, widely used in IS in SMEs case study research.

The sampling strategy therefore is purposeful, defining SMEs by number of employees. As the participating SMEs are based in the UK, the EU definition for number of employees is most appropriate. This definition states that a micro enterprise employs fewer than ten people; that a small enterprise employs fewer than fifty people; and that a medium-sized enterprise employs fewer than two hundred and fifty employees.

In the following sections, this chapter classifies the SMEs according to these categories. Four micro firms, three small firms and five medium-sized firms are categorised. The chapter presents a profile for each of the twelve SMEs and describes the IS structure in the SMEs. The chapter further introduces the ASP solutions adopted by the SMEs.

## 5.1 Micro firms

Micro firms employ fewer than ten people. Four firms are micro businesses: AQO, KBC, PB and TA. These firms are profiled in the following sub-sections including an outline of the firms' IS structure and ASP solutions.

### 5.1.1 AQO

AQO is a registered limited company launched in 2002 that sells numerous types of confectionary on the internet in an online sweetshop. AQO specialises in supplying the retro and funky types of sweets that were around in the 1970s and 1980s. As AQO has been trading for fewer than four years it qualifies as start-up firm. AQO was originally set-up for one key reason - the owner saw a business opportunity: '*the whole idea started with my brother in a pub talking about childhood and sweets and realising that you could not get our childhood sweets anymore. We were wondering if you could still get these sweets: we looked on the internet and checked out a couple of wholesalers but we couldn't really find anything. Then we thought one of the nice things about the internet is it costs next to nothing to set something up and we decided to give it a go just on a very small scale and see what would happen - that's how the idea came about'*

(AQO-1, MP). Thus the main motives for setting up AQO were those of the owner who spotted a business opportunity.

AQO is based in Buckinghamshire and employs one full time member of staff and one long-term temp who helps the owner run the company on a day-to-day base. As a seasonal business, AQO also employs staff on a short-term temporary basis whenever needed. The customers of AQO are mainly individuals with a handful of companies ordering sweets online.

AQO owns six PCs and one Mac. The PCs are used to run the business on a day-to-day basis. The Mac was bought to check whether the website is displayed and run correctly on Mac computers. Seven printers complete AQO's hardware capabilities. One colour printer for printing receipts and invoices, one audit, one fax printer, one printer for printing labels, one for personal use of the owner, and the rest are not in use. AQO operates Microsoft Windows and Office XP system software. Core application software includes Microsoft Outlook, Macromedia Dreamweaver and Fireworks as well as a number of smaller programs like Crystal Reports that facilitate specific tasks. The core telecommunications device is a broadband internet line provided by a company called Zen Internet.

In September 2002 AQO adopted an ASP-based online credit card payments solution. This solution is provided by a firm called World Pay which is part of the Royal Bank of Scotland. The solution processes online payments from AQO customers who are automatically taken to a secure World Pay website/server upon clicking on payment by credit card as part of the online purchasing process. Online payments are the major form of payment for AQO accounting for about 95% of payments. The ASP solution therefore is a critical business application for AQO as without it, the firm would be unable to take and process the majority of payments.

### 5.1.2 KBC

KBC is a micro firm operating in the kite sports business. Kiteboarding is an extreme sport that combines surfing, windsurfing, skateboarding and kite-flying. The firm is made up of two major parts: a kiteboarding shop and a kiteboarding school. KBC's mission statement is 'to provide everything that anyone who wanted to do kite sports

wants' including gear, support and training. The firm was found in January 2002 and is based in North Devon. KBC, which qualities as start-up firm as it has been trading for fewer than four years, is a lifestyle firm. Lifestyle firms are set up to provide the owner-manager with an adequate income whilst enabling the owner-manager to undertake an enjoyable activity (Burns, 2001). The owner of KBC was originally *'doing an IT course at college'* (KBC-1, JM) but then he decided *'I am going to Kite surf'* (KBC-1, JM) following his kiteboarding passion and set-up KBC. Thus KBC is a life-style firm.

KBC, a registered limited company, is owned by three directors. The firm employs four instructors and one shop assistant in the summer months. Outside the main summer season the owner who is managing the business on a day-to-day basis is actively running the shop and the school, including instructing. The kiteboarding market has grown extremely quickly in the last couple of years. The typical customer of the firm is between 25 and 40 years old, in a professional job and with some money to spare. There is no particular influential customer or customer group although many customers work in IT, telecommunications and media or are doctors - people who have a reasonable amount of income.

KBC owns one Sony Laptop, one Pana Mac T4 and one printer. To aid the teaching side of the business, the firm has two semi-digital video cameras. KBC uses Microsoft Office applications for personal productivity and runs a horizontal market software called EPOS which provides stock control, ordering and accounting functionality. Photoshop aids the firm's PR and Dreamweaver is used for making changes to the firm's static website. Netscape is used as e-mail client and is considered a good tool to protect the firm from virus attacks. The core telecommunications device is a satellite broadband link which is shared with a number of other businesses in the town.

In April 2003 KBC adopted an e-payments ASP solution. This is the same solution that AQO adopted and is provided by the same vendor, World Pay. This solution is integrated with the e-booking solution and enables online bookers to pay for kiteboarding courses on the internet.

### 5.1.3 PB

PB is a micro firm that offers professional business services, finance and advice to creative service firms such as design agencies, PR firms, advertising agencies, and television producers. PB is a limited liability partnership, run by nine directors, and based in London. The nine partners set up PB in October 2001 and at the time of the study employ two personal assistants and one corporate and market analyst. PB was set up with the intention to make money: *'our objective is to bring together creative service firms, take minority stakes in the businesses for which we work and float, trade or sell them when the market conditions are right'* (PB-1, HM). PB therefore is a firm set-up with the intention to grow and make money.

As the nine partners of PB mainly work in different geographical locations, a specific characteristic of PB is the virtual office. Whilst the firm has an office in London where the three employees are based, the partners mainly work in virtual offices. All nine partners have company laptops. A couple of desktop PCs, printers and other hardware are available in the London office. The core software packages used are Microsoft Office applications such as Word and Excel. Most partners have broadband telecommunications at home. The partners that do not have broadband at home use telephone lines for telecommunication purposes. The London office is connected via broadband.

In January 2002 PB adopted an e-mail ASP solution provided by Netstore, a specialist ASP provider. This solution provides Microsoft Outlook and Exchange server functionality to the fifteen users at PB and gives the users world wide access to the solution from any telecom point. In 2003 Netstore was taken over by another IS services firm called Cobweb which subsequently supplies PB with the ASP solution. As PB heavily depends on the virtual office, this ASP solution is critical for PB: e-mail is the major internal and external mode of communication.

### 5.1.4 TA

TA is an IT services provider based in West Wales. Eight people work for TA which has been trading for more than ten years. Whilst independently managed, TA is entirely owned by another firm and acts as IT department for this firm's seven departments. TA was originally set-up to provide IT services to this owner firm. Over the years, TA

started to provide IT and IS services to external customers. Now TA has about 50-60 external customers, many of whom are local micro SMEs and education and government institutions. Approximately 60% of TA's activities incorporate IS and IT services and support. The remaining 40% is trade of IT equipment and tools.

As an IT services provider, TA has a sizeable IS structure. The firm has four servers: one file and print server, one SQL server, one Exchange server, and one mini Intranet server. Eight laptops, one Apple Mac, approximately twenty PCs and five printers are the core hardware capabilities of TA. Of the five printers, one is a big, quick Xerox printer, one is a matrix printer, and the remaining ones are label printers. Windows XP is the operating software used by TA. Utility software includes MacAfee antivirus software. Personal productivity software includes Microsoft Office 2000 and XP packages, Visio and Outlook Photoshop and an Auto Route. TA further uses horizontal market software such as an accounting package and auditing software. The core telecommunications device is a broadband line into the business park where TA is based. TA is the only micro firm that has its own intranet.

In summer 2002 TA used a fully integrated text messaging solution for one month. This solution does text messaging services for more than one dimension from the PC and was provided by 2SMS, a specialist e-text messaging provider. The solution can be used in two ways: as a 'pay as you go' service where money is added to an online account and this account is then debited according to the number of text messages sent; and it can be integrated with in-house systems and send text messages from this in-house system which is what TA trialled in 2002. At the time of the study TA only uses the pay-as-you-go version of the ASP solution.

## 5.2 Small firms

The second SME category is small firms. Small firms employ between eleven and fifty people. Three SMEs, profiled in this section, are small firms: ZI, MP and EMT.

### 5.2.1 ZI

ZI is registered as a limited company and based in the South West of England. The firm provides full range management consultancy to the food and beverage industry. The

main activities of ZI involve comprehensive market analysis, strategic and commercial advice, financial and technical consulting projects, information services, trade journals and event organisation. Approximately thirty-five members of staff work for ZI which was formed in March 1991 and is owned by six directors. ZI has a variety of customers that are split into three core groups: customers with little turnover, customers with considerable turnover and key customers labelled group one clients.

The IS structure at ZI is as follows: the firm has three servers, a file server, an e-mail and fax server and one SQL server. Every member of staff has a computer on the desk, resulting in about 40 PCs in total. ZI further owns seven laptops and ten printers. The system software is Microsoft Windows 2000. Personal productivity software includes Microsoft Office 2000 packages as well as Microsoft Outlook. Telecommunications include ISDN connectivity, a 2MB broadband connection and a firewall to protect the firm from outside attacks. ZI has an IT department staffed with two IT professionals.

In late 1998, ZI adopted an ASP solution as part of a communication package that acts as a holding pot for e-mail. The solution is provided by Advances, a service provider based in the USA. One central in-house PC automatically collects e-mails from the provider's server and the client machines collect these e-mails from the in-house server. The in-house server acts as inter-medium for the client machines.

### 5.2.2 MP

MP is a small firm founded in 1998 that produces antiserum from animals and manufactures therapeutic antibody products. These products can be used in research, diagnostics and therapy. MP is a privately-owned limited company that operates from four locations within a ten mile radius of its West Wales location. Eleven members of staff including the two major shareholders run the company. Customers of MP include Universities and research institutions, large diagnostic companies and departments of health in foreign governments of developing countries, with a particular focus on sub-Saharan Africa.

MP owns six standalone computers, a laser printer and a number of desktop printers. The firm does not own any laptops. MP has no IT department and sources all its information and computing capabilities and services from one single external IS

services provider. Operating software is Microsoft Windows. Software applications include Microsoft Office packages and Outlook for e-mail, Publisher, and Sage for accounting. In terms of telecommunications, the six PCs are either individually connected to the internet or not connected at all. The internet connection is via ISDN dial up.

MP adopted a website statistical monitoring solution in 2002. This solution is provided by Telem@, the IT services provider that acts as IT department for MP. This ASP-based solution is run on the server of Telem@ and accessed by MP via the internet. The purpose of the solution is to provide a statistical monitoring service for MP's website such as information about website visitors.

### 5.2.3 EMT

EMT is a regional theatre. It was built in 1891 and focuses on two main areas of activities: it runs a theatre stage with a 682-seat auditorium in Gloucestershire and it engages in community and education activities in the area. These two strands co-exist beside each other. EMT is a registered charity intertwined with a company limited by guarantee and owned by the county council. The charitable objective of the theatre relates to the advancement of education through the arts. EMT itself produces a few shows and brings in most of the shows from outside. The customers watching these shows are diverse, classified as average standard theatre going audience from the Gloucestershire, Worcestershire, West Oxfordshire, and Herefordshire catchment area. Thirty full-time and seventeen part-time members of staff guarantee the day-to-day running of the theatre. The EU definition does not differentiate between full time and part-time employees. Small firms employ fewer than 50 people and as EMT employs thirty people full time it is classified as a small firm. If part-time employees are calculated on a ½ basis (17/2 = 8.5 full time employees), EMT still employs fewer than fifty people.

EMT owns twenty-nine computers and has a printer for each office. The theatre does not own any laptops. EMT operates one core network and two sub-networks. One key server runs the main network and three mini servers run the sub-networks. The catering department operates a separate computer network with six computers. The theatre has an internet café with a further eight computers. This internet café has no printing

facility. Whilst the internet café runs on Microsoft Windows 2000 operating software, the rest of the theatre runs on Windows 98 and Office 97 applications. Microsoft Outlook is used for e-mail communication. Vertical market software includes Sage accounts software. The core telecommunications connection is a 2MB broadband line. EMT has no IT department: *'we're not big enough to have things break off and employ somebody the whole time'* (EMT-1, PB). An external IS services provider acts as IT department whenever EMT needs IS and IT support.

EMT has an e-ticketing solution procured via the ASP model. This solution enables the theatre to sell tickets on the internet. Tickets.com, a specialist ticketing software vendor, provides the ASP-based e-ticketing solution to EMT. The theatre adopted this solution in autumn 2001.

## 5.3 Medium-sized firms

Medium-sized firms employ between 50 and 249 people. Five firms are medium-sized: BLT, NWT, TRP, FDL and AT. These firms are profiled in this section.

### 5.3.1 BLT

BLT is one of the largest regional producing theatres in the country. The theatre, a charitable trust, opened in March 1958. As well as producing their own shows BLT brings in shows and stages touring productions. At home in an English Heritage grade II listed building the theatre has a two-tier auditorium holding 866 seats and is currently building a second auditorium. This auditorium is being built to attract a more diverse audience. The BLT attracts a general audience in line with the industrial background, mainly from a thirty mile, thirty minute drive radius of the theatre. About one hundred people work at BLT of which about fifty are full time.

BLT owns one server, approximately twenty-five PCs, a couple of laptops, one Apple Mac and five to six printers. These PCs and laptops run on various versions of Microsoft Windows operating platforms from NT to XP. Core application software are Microsoft Office packages, Microsoft Outlook e-mail and an accounts application called Thick Pot. In terms of telecommunications, BLT relies on a broadband internet connection. BLT also has an Intranet which is mainly used for internal communication

such as rehearsal schedules, formal notices, and marketing minutes. BLT has no dedicated IT department but sources IS and IT from various external companies.

BLT has adopted the same ASP-based e-ticketing solution as EMT. This solution is sourced from the same provider, tickets.com. BLT adopted this solution in 1999.

### 5.3.2 NWT

NWT is a theatre that covers every spectrum of live entertainment and performance. It opened in 1994 and is a principal receiving theatre: the theatre does not produce shows in-house and all the shows staged at its 1500 seat auditorium are brought in. The theatre's customers are predominantly semi-retired and retired with the catchment area being mainly North Wales and North West England. NWT is owned and funded by the local council and employs approximately fifty full time and about twenty five to thirty part time and casual staff.

NWT is a PC based venue. It owns approximately thirty PCs, four laptops, and about twenty-five printers, both individual desktop printers and large network printers. This hardware is operated through Microsoft Windows 2000 systems software. Application software is mainly Microsoft Office 2000 applications and industry specific software such as ticketing software. Telecommunications is based on a broadband internet connection and a computer network with local authority. NWT has an IT department which is provided by local authority. Eighteen people work in this local authority department and two of these employees are responsible for IS and IT at NWT.

NWT uses the same ASP-based e-ticketing solution that EMT and BLT use. The solution is again provided by tickets.com the ticketing software specialist that concentrates on providing ticketing software solutions for the entertainment industry. NWT adopted the ASP solution in 1999.

### 5.3.3 TRP

TRP is the fourth theatre of the sample. Opened in 1982, TRP prides itself as being one of the largest and best-attended regional producing theatres in Britain and is a leading promoter of theatre in the South West of England. The theatre stages everything from

drama, to opera and dance companies, and produces as well as co-produces a number of drama and musical productions each year; about 30%-40% of the productions are produced in-house. The theatre houses two stages: the main stage, which holds about 1300 people and a smaller auditorium, which holds about 200 people. Whereas the main stage aims to attract a wider-based audience, with the smaller auditorium the theatre aims to attract a non-traditional theatre audience by bringing in new plays, young writers, and cutting edge drama. Musicals are very popular, as are pantomimes at Christmas time. The TRP has a core group of bookers, which contains about 8,000 – 10,000 people. The catchment area is south of Somerset to Cornwall plus tourists in the summer. Approximately 100 people work for TRP including full- and part-time employees.

TRP owns approximately seventy-five computers and ten laptops used solely by upper management employees. Other hardware includes some twenty printers the majority of which are black and white laser printers. There are also two heavy duty account printers, the odd colour printer, and one large networked colour printer. TRP owns one standalone mail server, one standalone file server, and an accounts server. Most of the computers at TRP run on Windows 98 and NT operating software. Application software includes Microsoft Office 97 applications such as Word, Excel, PowerPoint and Access. Utility software used includes MacAfee antivirus and spam software. The telecommunications core is a broadband link. TRP has no IT department but sources IS and IT from one key external provider who has a member of staff dedicated to TRP issues. This member of staff spends three days per week at TRP.

TRP is the fourth theatre that uses the tickets.com ASP solution. This solution was adopted in December 2003.

### 5.3.4 FDL

FDL supplies specialist ingredients to the food, beverage, fragrance and chemical industries. Found in 1884, the firm trades in six divisions: food and beverage ingredients, seeds and natural products, juices division, honey division, essential oils and aroma chemicals and castor and industrial chemicals. FDL's head office is in London with medium-sized offices and operations in the US, China, India and Switzerland. Sales representations are mapped around the world excluding Africa and

South America. The various divisions of the company are brought together under the roof of a holding, in the form of a private limited firm. There is one major shareholder for the holding who is supported by a board of seven directors. FDL employs about 120 members of staff.

The food and beverage division (F&B) of FDL is one of the largest importers of ingredients for the beverage industry in Europe. The division is mainly trading and supplying products to the food, beverage and fragrance/flavour industries. Materials supplied include minerals, vitamins, preservatives, amino acids, antioxidants, sweeteners and colours. 65% of the business of the food and beverage division is within the UK. The balance is made up of dispatches to the European economic area and trade with other regions. The division, which is based at the firm's London headquarters, has ten key customers and around fifty significant customers, with the total number of customers exceeding one hundred.

The F&B division has use of four PCs and eight terminals. Within the division the employees share six laptops. The software on these computers is Microsoft dominated: systems software includes Windows 98 and 2000 and application software includes Office (Word, Excel, PowerPoint) and Outlook. The core telecommunications tool is a broadband internet line. FDL's IT department, which employs four people, acts as IT and IS service provider to the F&B division.

The F&B division of FDL adopted an e-supply chain solution in mid 2001. This solution is provided by WeSupply, a specialist ASP supply chain solution provider. The purpose of the solution is to enable one major customer of the F&B division to manage its supply chain. Four people in the division use the solution: the shipping manager (user), the divisional director (rare user), the distribution manager F&B (heavy user), and the distribution officer F&B (main user). The distribution manager F&B looks after trouble shooting, holiday cover and overall management of the solution. The distribution officer (F&B) operates the solution on a day-to-day basis. About 10% of total orders of the division come from the key customer.

### 5.3.5 AT

AT is a non-profit making organisation that was founded in 1979 as a grassroots community initiative to promote economic and social development in West Wales. As of June 2003, approximately 130 people work for AT in its twelve locations around West Wales. The T-unit of AT is the mobile information and communication training unit that provides doorstep IT training. The unit consists of two mobile training trailers equipped with a number of technical tools. These trailers are towed to various locations in West Wales and provide IT training on the spot. The first, older trailer consists of a PC for the tutor and up to twelve laptops for the students. The second, more modern unit, has got ten computers of which one is for the tutor and the other nine for the trainees. The training provided is of a wide range including computer courses for beginners, Microsoft Office software, website building and design courses. In general, the T-unit is trying to provide any IT training on demand in the area.

Whilst the T-unit has two trailers dedicated for IT training, the three members of the unit have three laptops plus docking stations in their offices. These run on Microsoft Windows XP and Microsoft Office XP applications. In terms of telecommunications, both trailers are equipped with Satellite broadband, and the offices are connected to the internet via a physical broadband line. The IT department of AT which employs eight people supports the T-unit in terms of IS and IT.

The T-unit of AT adopted an e-mail ASP solution provided by Netstore in February 2002. This solution, which provides Microsoft Outlook and Exchange server functionality, is the same ASP solution that the micro firm PB uses. Unlike PB however, the T-unit of AT ended their contract with Netstore after twelve months in February 2003 and thus discontinued using the solution. This discontinuation is discussed in Chapter Seven, Section 7.5.4.

## 5.4 Chapter summary

This chapter profiles the participating SMEs. It describes each SME, explains the IS structure of the SME and introduces the ASP solution adopted by the SME. Four firms are theatres (EMT, BLT, NWT and TRP), three SMEs are service firms (PB, AT, ZI) one is a specialist trader (FDL), one is an IT services provider (AT), one is a research firm (MP), one is an internet business (AQO) and one provides sports services (KBC).

All SMEs are classified into micro, small and medium-sized firms, according to the definition of the EU. The sample is a reasonable mix of SME categories: four firms are micro SME, three firms are small SMEs and five firms are medium-sized SMEs. As of 2004, PB, AQO, and KBC, are start-up firms having been trading fewer than four years. MP is a young firm trading fewer than ten years. NWT, ZI, TRP, AT, and BLT are established firms that have been trading for fewer than fifty years; and FDL and EMT are mature firms trading for more than fifty years.

IS at the SMEs are dominated by Microsoft software applications and desktop PCs. All firms have computers yet support varies across categories. In micro firms, owner(s) and employees are the core source of IS and IT knowledge and support. External support from IT experts is rarely used. In the small firm category, one SME, ZI, has its own dedicated IT department with two employees. The other two small firms, EMT and MP, rely exclusively on external IS and IT expertise. Both firms have a strong business partnership with one dedicated IS services provider that acts as their IT department when necessary. In the medium-sized firm category FDL, NWT and AT have their own IT departments. BLT and TRP have external IT and IS service providers that act as their IT department. All SMEs apart from MP have a broadband internet connection.

The SMEs have adopted twelve ASP-based solutions. The micro firms use e-payment, e-mail and e-SMS. The small firms use e-mail, e-stats and e-ticketing. The medium-sized firms use e-ticketing, e-supply and e-mail. The e-ticketing solutions are provided by tickets.com. The e-mail solutions are supplied by Netstore/Cobweb (AT, PB) and Advances (ZI). The e-supply solution is provided by WeSupply, the e-payment solution by World Pay, e-SMS by 2SMS, and e-stats by Telem@.

Chapters six, seven and eight analyse and discuss ASP adoption, implementation, operation and consequences in the micro, small and medium-sized firms respectively. This approach to data presentation and analysis corresponds to the SME sampling strategy chosen for the research.

# 6 CHAPTER SIX: ASP IN MICRO FIRMS

This chapter discusses ASP diffusion in the four micro firms AQO, KBC, PB and TA. Three of these micro firms, AQO, KBC and PB are start-up firms that have been trading for fewer than four years. The chapter describes and discusses ASP adoption, implementation and consequences in AQO, KBC, PB and TA respectively. The chapter concludes with an analysis of the diffusion phases at the micro firms.

## 6.1 E-payment diffusion at AQO

AQO, the online sweets retailer, adopted an e-payments ASP solution in September 2002. The owner of AQO first and foremost decided to adopt an e-payments solution because *'essentially every internet shop is going to need a way for processing credit cards'* (AQO-1, MP): without the e-payments solution, the owner would not have been able to start an online business. Thus AQO had a need for an e-payments solution. As the owner neither has the skills nor the time to develop and maintain an e-payments solution he needed external help. AQO's owner further *'didn't want all the time'* (AQO-1, MP) and hassle *'there's too many questions on security'* (AQO-1, MP) of handling and processing credit cards in-house. The entrepreneur found e-payment options *'on the site of the package, they say all the options of credit card processing'* (AQO-1, MP). AQO chose the World Pay solution because *'it linked in with the software that I was using and it was quite easy to set up'* (AQO-1, MP), the provider has a *'reputable name'* (AQO-2, MP), and the solution was a full credit card processing application, it does *'everything'* (AQO-2, MP). Other core reasons for using an external provider included that this would enable the owner to concentrate on setting up the business without having to worry about the e-payments side of it *'it was nice to have this bit sorted out'* (AQO-2, MP); and that the application is *'a very secure system'* (AQO-1, MP) and credit card security issues and problems would be the responsibility of the provider.

The implementation of e-payment was quick and straight forward *'there's nothing to it really; it is just written to do it'* (AQO-1, MP). Before the system went live the owner took the option to test the solution in test mode. The owner of AQO, who considers himself computer literate, did not get formal training on the solution, *'everything was by e-mail'* (AQO-1, MP).

AQO pays a standard rate of £150 per annum for the ASP solution to World Pay plus 4½% of any transaction on a credit card or 56p on any transaction with a debit card. Online payments are the major form of payments for AQO accounting for about 95% of payments. The remaining 5% are payments by cheque. The application is fully integrated with the online shop, '*World Pay has geared their end towards the software'* (AQO-1, MP). Vendor support for the solution is via e-mail and telephone: *'if you got a real problem you can you phone them up but generally it is over e-mails'* (AQO-1, MP). At the time of study AQO has never experienced *'a big problem with World Pay'* (AQO-1, MP). The maintenance of the solution rests with the provider, AQO does not get involved. AQO has a *'bog standard'* (AQO-1, MP) standard contract with World Pay. There is no Service Level Agreement (SLA) between World Pay and AQO.

AQO experiences desired, undesired and risk consequences from the adoption and use of the e-payment ASP solution. A desired consequence is that the solution is a problem free solution *'it won't go down'* (AQO-1, MP) that provides *'secure credit card processing'* (AQO-1, MP) to AQO and its customers. One big advantage for the owner is that the solution allows him to focus on his core business activities '*one of the nice things about it is I don't know and I don't care ... otherwise you spend all the time doing that and you wouldn't be doing what you should be doing'* (AQO-1, MP). The solution further enables AQO owner and staff to realise efficiency gains as there is no need to process credit card payments. The solution further gives the customers of AQO superior credit card transaction security and allows AQO to grow as well as deal with seasonal fluctuations. Another desired consequence is that the e-payments solution allows AQO to grow without having to worry about its credit card online transactions *'the capacity of World Pay is miles bigger than anything that we will ever put through it'* (AQO-2, MP) and seasonal fluctuations do not affect the solution at all. Whilst these desired consequences are positive for AQO, undesired consequences include the delay in payments from World Pay: *'the standard with them is you get the money four weeks after they get it'* (AQO-1, MP). This payment delay is a financial burden for AQO as is the cost for the solution: the solution is expensive, the provider takes *'quite a lot of money'* (AQO-1, MP) for it. Another undesired consequence is that AQO feels they are not a top priority for the provider: *'as far as World Pay is concerned we are tiny, and if we wanted any suggestion or a special agreement they just think bog standard'* (AQO-1, MP). Besides desired and undesired consequences, AQO identifies one risk

consequence which is the exposure to credit card fraud: *'the worst thing about it is someone using a credit card fraudulently, but as long as it doesn't happen too often [it has happened probably about half dozen times] it is just one of those things that you either accept or you shut the shop'* (AQO-1, MP). Figure 17 presents the diffusion of e-payment at AQO discussed hitherto.

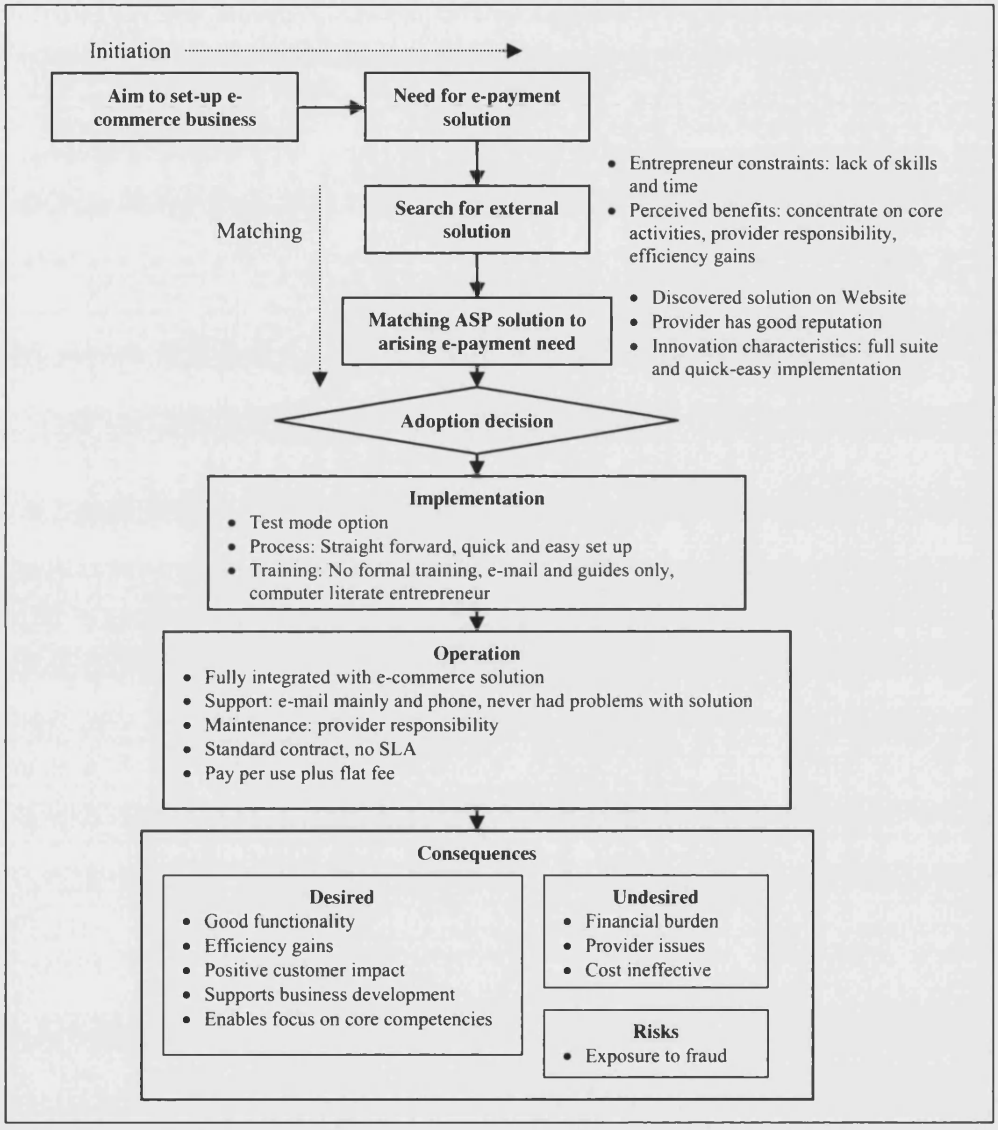


**Figure 17: e-payment diffusion at AQO**

At AQO the need for an e-payments solution did arise because it is a necessity for e-commerce and was thus a requirement for starting the firm. The entrepreneur had to search for an external solution because he does not have the skills and time to develop one. He further perceived a number of benefits from external application sourcing: an external application would enable him to realise efficiency gains because there was no

need to handle credit cards in-house. The benefits of having an external expert in charge of the solution further enabled him to concentrate on setting up the business.

The entrepreneur discovered the solution on the website of his internet shop vendor. From this website, which lists e-payment options, he chose World Pay because the firm has a good reputation. He chose the solution because of its characteristics: it is a secure, full credit card processing application that was quick to implement and easy to set up. These initiation and matching stages of the diffusion process led to the entrepreneur's decision to adopt the World Pay e-payment ASP solution. The implementation of e-payments was straight forward, quick and easy. The computer literate entrepreneur had no training from the provider; he implemented the solution based on guides and e-mails and learned about it through the test mode option and through using the application. The application is fully integrated with AQO's online shop. The ASP provider supports AQO over e-mail and telephone and is in sole charge of application maintenance. AQO has a standard contract with World Pay. There is no SLA between the two firms.

In terms of consequences, AQO experiences five desired, three undesired and one risk consequence. The desired consequences include good solution functionality, efficiency gains from time and work savings and positive impact for AQO customers through superior credit card transaction and security. The e-payment solution further supports business development and enables both owner and staff to focus on core business activities. Undesired consequences include the financial burden of a four week payment delay and the cost ineffectiveness of the solution as it is expensive. AQO is only a tiny customer for the provider and this provider issue is the third undesired consequence. The risk consequence is that the solution exposes AQO to fraud, and credit card fraud in particular.

## 6.2 E-payment diffusion at KBC

KBC, the kiteboarding specialist, uses the same World Pay e-payment ASP solution as AQO. The firm adopted the solution in April 2003. When the owner of KBC received government funding to develop an e-commerce solution with a partner firm he needed an application that would enable his customers to pay over the internet: *'it is essential to have payments taken online'* (KBC-2, JM). The government funding included cost for the e-payment solution. KBC's partner firm carried out the search for a suitable solution

and discovered World Pay. World Pay was chosen by KBC because the partner firm recommended this solution *'Ian found the package and recommended it'* (KBC-2, JM). This recommendation was based on the following criteria: World Pay has *'the best package that suited us'* (KBC-2, JM); and *'the man that developed the site could integrate it really easily'* (KBC-2, JM).

There were *'not any problems at all'* (KBC-2, JM) with setting up and implementing the e-payments solution. The implementation of the solution was done by KBC's partner firm. There was no formal training for the solution. The owner of KBC thinks that training was not necessary because he is computer literate.

In the first year of use the government funding covered all cost for the e-payment solution at KBC. Thereafter KBC pays a flat fee of £125 plus VAT per annum and a flat rate of £2.50 per credit card transaction. The e-payment solution is fully integrated with the online suite: *'it is built in - customers type in their name, the date and all that kind of stuff and then it goes to the payment page that does the transaction'* (KBC-2, JM). As there have *'never been any problems at all'* (KBC-2, JM) with the World Pay solution, KBC is not aware of support from the provider. Maintenance is the responsibility of the provider. KBC has no SLA with World Pay.

KBC experiences desired, undesired and risk consequences from the adoption of the e-payment ASP solution. Desired consequences are that the solution has a very good functionality *'there have never been any problems at all'* (KBC-2, JM) that provides KBC and their customers with *'live, online, and all secure'* (KBC-2, JM) credit card transactions. Undesired consequences include the fact that, compared to other credit card payment options, the e-payment solution is cost ineffective: it is expensive, the price is *'quite high compared to the terminal in the shop'* (KBC-2, JM). Whereas the e-payment solution costs £125 plus VAT per annum and a flat rate of £2.50 per credit card transaction, the credit card terminal that KBC uses in its Kiteboarding shop costs *'£200 a year and 24p for a debit card and £1.49 for credit card'* (KBC-2, JM). Additionally, there is a five week payment delay from World Pay: *'five weeks later we get the money which is annoying'* (KBC-2, JM). In contrast, for terminal transactions in the shop KBC *'gets the money two days later'* (KBC-2, JM). KBC identifies one risk consequence from the e-payment ASP solution: credit card fraud: *'you log on, book your course, then have the course and then they can send an e-mail to World Pay and*

*get a refund. There is not much I can do about it, I had someone this year try it on, he said it was a really nice course -luckily I had a couple of e-mails from him, one of them said thanks for the course it was really good- and then he tried to get his money back but he didn't try to get the money back from me he went to his card company and I got a letter from Barclaycard saying we're taking the money back because you haven't provided the product. Luckily I just had to print off all the e-mails and send it to them to sort it out'* (KBC-2, JM). Figure 18 presents the e-payment ASP process at KBC.

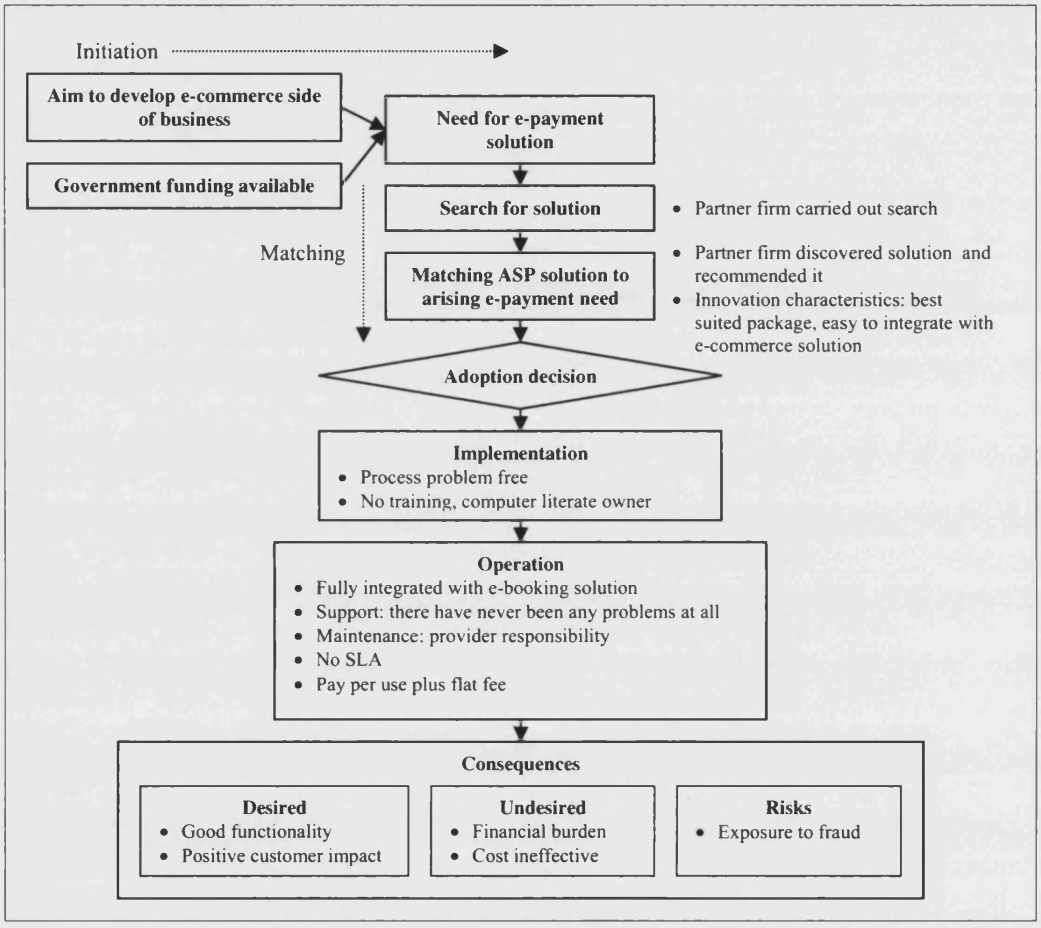


**Figure 18: e-payment diffusion at KBC**

E-payment diffusion at AQO and KBC is similar. Both firms adopted the solution because it is a necessity for e-commerce. Whilst KBC was set-up before the e-commerce side of the business was developed, AQO is a pure internet business. The difference in the initiation phase is that for AQO efficiency gains played a role and for KBC government funding to cover cost was a factor. In the matching stage, the owner of AQO, constrained by lack of skills and time, chose to search for an external solution because this would enable him concentrate on core activities and problems with e-

payments would be the responsibility of the provider. The owner of KBC left the search for a solution to his partner firm. Respectively, the owner of AQO and the partner firm of KBC did discover World Pay. For both firms, the characteristics of the e-payment solution essentially instigated adoption of the World Pay solution. For AQO it was that the solution is an all-inclusive package that was easy to set up. For KBC it was also because it was easy to set up and because it is the best available package that best suits the firm. At both firms the owners made the decision to adopt the solutions.

Implementation of e-payments was no problem for AQO and KBC. It was quick and straight forward in both firms, yet both owners are computer literate. The owner of KBC even has an IT degree. There was no formal provider training for the micro firms. In terms of operation, both solutions are fully integrated with the e-commerce packages of the firms. Both firms never had a problem with their e-payments solution and maintenance is the responsibility of the provider in both firms. Whilst KBC is not aware of provider support, World Pay assists AQO over e-mail and telephone. Whilst AQO and KBC use the same solution from the same provider, they pay different prices. Both firms pay a flat fee per annum: KBC pays £125 plus VAT and AQO pays £150 per annum. On top of that flat fee, AQO pays 4½% per credit card transaction and 56p per debit card transaction. KBC pays £2.50 per credit card transaction. While AQO has always paid for the solution, government funding covered cost for the solution at KBC in the first year. Thus cost for ASP-based e-payments is calculated on a flat fee plus a fee per transaction. The transaction fee can be a flat fee per transaction or a percentage of the transaction amount.

Whereas AQO experiences five desired consequences, KBC experiences only two desired consequences. These two are also identified by AQO: very good system functionality and positive customer impact through live and secure online credit card processing. Financial burden and cost ineffectiveness are the two undesired consequences identified by KBC. These are the same undesired consequences as AQO; yet, AQO also mentions provider issues which KBC does not. The risk consequence again is the same for KBC and AQO: credit card fraud. Thus, although AQO identifies three more desired consequences and one more undesired consequence than KBC, the consequences identified by KBC are all identified by AQO as well.

## 6.3 E-mail diffusion at PB

PB, the business services provider, adopted an e-mail ASP solution in January 2002, three months after the firm was set up. PB needed an e-mail application because e-mail is the *'main system for communication within the business'* (PB-4, DP). When setting up PB, the partners, most of who are experienced entrepreneurs, were looking for an application that would not bear the typical high cost and operating responsibilities of business IS. The entrepreneurs therefore decided to look for an *'externally managed solution that would give access to an Outlook database of a relatively large size'* (PB-4, DP). Sourcing an e-mail solution from an external provider was favoured because PB did not need to acquire IT skills *'the last thing I wanted to do was to set up and manage a team of techies, I'd much rather have someone else doing that'* (PB-1, HM).

The technology literate entrepreneurs of PB were aware of the ASP concept *'knowledge of what ASP is, was around the table'* (PB-1, HM). The partners engaged in a *'Google search and found two or three providers. We phoned up these providers, asked for a quote and in the end we could only locate one provider, Netstore, which could do what we wanted'* (PB-2, HM). PB chose the Netstore solution because it was *'secure and easy to set up'* (PB-2, HM); it was instantly available and *'very affordable, costing £20 per user per month including support'* (PB-1, HM); and it would enable the partners to *'experiment with a CRM system'* (PB-2, HM). The solution further has the potential to grow with the firm *'it had room for us to grow with them into the future'* (PB-1, HM). Upon contact, Netstore *'also seemed accessible and helpful'* (PB-1, HM). Another issue that attracted PB was that *'Netstore explicitly indicated on their website that they were looking for resellers'* (PB-1, HM), which PB saw as a potential future business opportunity.

Implementation of the e-mail ASP solution was straight forward: *'it was very quick, easy and simple: it only took a couple of phone calls and a fax and we were set up'* (PB-1, HM), just like a 'solution-out-of-the-box'. Since not all partners were Outlook literate, one of the entrepreneurs set up a training session when the solution was implemented: *'I had to provide some general Outlook training as a few of the partners weren't familiar with Outlook'* (PB-2, HM). Netstore does offer formal training sessions but PB has not *'used any of Netstore's training capabilities'* (PB-4, DP). Additionally, partners and employees were learning-by-doing: *'I found with Outlook it is a bit like learning to drive a car: the only way to learn how to drive a car is to get into one'* (PB-

2, HM). Hence, for some people it was *'a bit difficult to start off but it was a huge learning process'* (PB-3, LW).

The ASP e-mail solution provides Microsoft Outlook and Exchange server functionality to the nine partners and three employees at PB at a cost of £20 per month per user. The ASP solution is partly integrated *'in the sense that it is a part of Microsoft office but data and document transfer does not work perfectly therefore it is almost integrated but not quite'* (PB-2, HM). Originally, support from the provider was deemed very good: *'I've always found them very helpful. The other day I had to set up some mailing lists for people inside our company and outside. The guys were really helpful and within 10 minutes I'd done it, it was incredibly easy. They've been very good at sorting out problems'* (PB-2, HM). However, following the acquisition of Netstore by Cobweb the support situation changed: *'technical support was good when it was with Netstore but now Cobweb is not concerned at all. They treat you like they're doing you a favour rather than a service. That really annoys me. And they give you solutions which are far more technical than someone that's not technical could handle; then they say stuff like do you not have a technical person in-house who can help you with this, which makes me think, why the hell would I be using an outsource service if I had someone technical inside?'* (PB-3, LW). A further problem with support is a *'lack of recognition of an issue and immediately assuming that you are the issue rather than they'* (PB-4, DP). Maintenance is the responsibility of the provider and PB is satisfied with maintenance arrangements from Cobweb.

PB experiences desired, undesired, neutral and risk consequences from the e-mail ASP solution. A desired consequence is that the solution is *'always up to date and secure* (PB-1, HM) and as a management tool it provides partners and employees with good calendar and task assignment function. This good functionality is paired with location independent e-mail access that *'allows a shared workspace between a whole set of geographically separated partners'* (PB-2, HM). The location independence enables PB to expand regionally as partners can operate from their regional bases: *'the ASP solution makes it possible for me to be at home working with West country clubs in the West country in a way that would be much harder to do if I was based in London'* (PB-1, HM). The solution not only supports business development in terms of regional expansion, it also supports business development as users can easily be added *'it is an extensible system that grows with us'* (PB-2, HM). Through the use of the ASP e-mail

solution, PB is able to realise efficiency gains particularly in terms of time and resource savings: *'it saves us time and the anxiety and effort of dealing with the solution in-house'* (PB-4, DP). *'I spend a lot of time on trains and it is immensely useful to be able to check my e-mail when I'm out and about'* (PB-2, HM). This also has a positive impact on PB customers as there is better accessibility to PB partners and staff. *'I'm always round seeing clients and travelling round the world and my clients don't know that I'm travelling. I sit on the train and e-mail them; and the clients don't even know that I'm on somewhere which is great'* (PB-2, HM).

Another desired consequence for PB is that the ASP e-mail solution is *'very affordable, costing £20 per user per month including support'* (PB-1, HM) and there is no cost for employing IT staff to look after the e-mail application *'at the cost of about a quarter of a person we have acceptable system resources'* (PB-4, DP). Overall, it is approximately *'a $10^{th}$ of the cost for the same functionality'* (PB-2, HM). There was no initial upfront cost *'we never had the expense up first compared to any other way of doing it'* (PB-2, HM) and in other financial terms, budgeting improves with ASP *'they can level it over the number of heads they've got in the office'* (PB-3, LW). Additionally to the aforementioned desired consequences, the ASP solution enables staff and partners at PB to concentrate on their core business activities *'it enables the partners to spend their time focussing on the business'* (PB-4, DP), *'rather than mess about with technical issues'* (PB-3, LW). At the time of study, the partners aim to offer the ASP service on a reseller basis to their customers: *'I brought a group of people together last week and it seems that we do go ahead with setting up a new consulting arm that just deals with the public sector. I'm very sure that we will be setting up an ASP solution for them again probably initially based on Netstore, and then fairly quickly when PB services is ready we will move it in-house'* (PB-2, HM).

Yet, along with these numerous desired consequences, PB experiences undesired consequences. A very serious issue is system limitations. The application *'goes down about four times a month and then comes back up after a couple of hours which is very frustrating'* (PB-3, LW). Additionally, the application is very slow, *'it takes so long to send and receive'* PB-3, LW) and suffers from a synchronisation delay *'if you want to use it offline you have to synchronise your folders which takes hours'* (PB-3, LW). Data and information have been lost as a result of system limitations *'it just locks up and that's it - you loose the e-mail'* (PB-3, LW). These system limitations foster

*'duplication of data'* (PB-4, DP). The web interface does not function properly either: *'it is incredibly slow and a really bad interface which makes it quite un-useful. I can't stand using it online and only use it as a last resort because you just have really basic function, there's no calendar, no changing stuff and tasks; you can read e-mails but that's about it'* (PB-3, LW). The solution also lacks a decent spam filter, there is *'too much spam'* (PB-3, LW). Another undesired consequence relating to technical issues is that ASP depends on a physical broadband connection: *'without broadband it is crap'* (PB-2, HM). As some of the partners have no access to a physical broadband line, their e-mail communication is severely restricted: *'those of us that don't have broadband at home it doesn't work terribly well'* (PB-2, HM). While the majority of PB partners consider the solution to be cost effective, some partners *'see £20 a month as being a lot'* (PB-1, HM). Whilst PB was satisfied with the provider Netstore, an undesired consequence that emerged with the acquisition by Cobweb is that Cobweb's service *'is not the best service in the world'* (PB-3, LW) and the partners feel that as one of many, *'if you experience a unique problem it doesn't necessarily appear high up on their solution's line in terms of things that need solving'* (PB-4, DP). One initial motivator for adopting the ASP e-mail solution was to experiment with a CRM tool but PB discovered that the solution is not a suitable CRM tool: *'one of the things that we are fairly frustrated by is trying to use it for fairly low level customer relationship management. Customising Outlook to do that is possible but it is actually not as easy as they pretend'* (PB-1, HM).

Besides desired and undesired consequences, PB reckons that at a certain cut-off point it will be viable to stop using the ASP solution: *'it will do for now, but if we grow any larger then we need to change and get a better system'* (PB-3, LW); *'with our current number of users it is not viable to operate the service in-house'* (PB-2, HM). This is an understanding that has neither a positive nor a negative effect for PB. Hence it is classified a neutral consequence.

The remaining consequence category is risks. PB reports that the network component of the e-mail ASP solution is a risk source: when there is a network problem and *'the issue is not our end and not at their end but somewhere in the middle then neither of you can necessarily solve the issue rapidly'* (PB-4, DP). Another security issue is that *'fundamentally, everybody is worried about security'* (PB-4, DP). PB acknowledges that dependency on a third party provider is another risk as the firm is *'highly dependent on*

*the supplier*' (PB-4, DP) for its e-mail communication and there is *'this dilemma of getting locked into a third party which can be quite high risk'* (PB-4, DP). The provider for example could *'suddenly hit us with a kind of backing up fee: I will delete all your files unless you give us 500 quid'* (PB-2, HM). The remaining risk is that PB is '*worried about not having data stored locally'* (PB-2, HM) and if Cobweb *'screw up we will be stuffed'* (PB-1, HM). Figure 19 presents the e-mail process at PB.

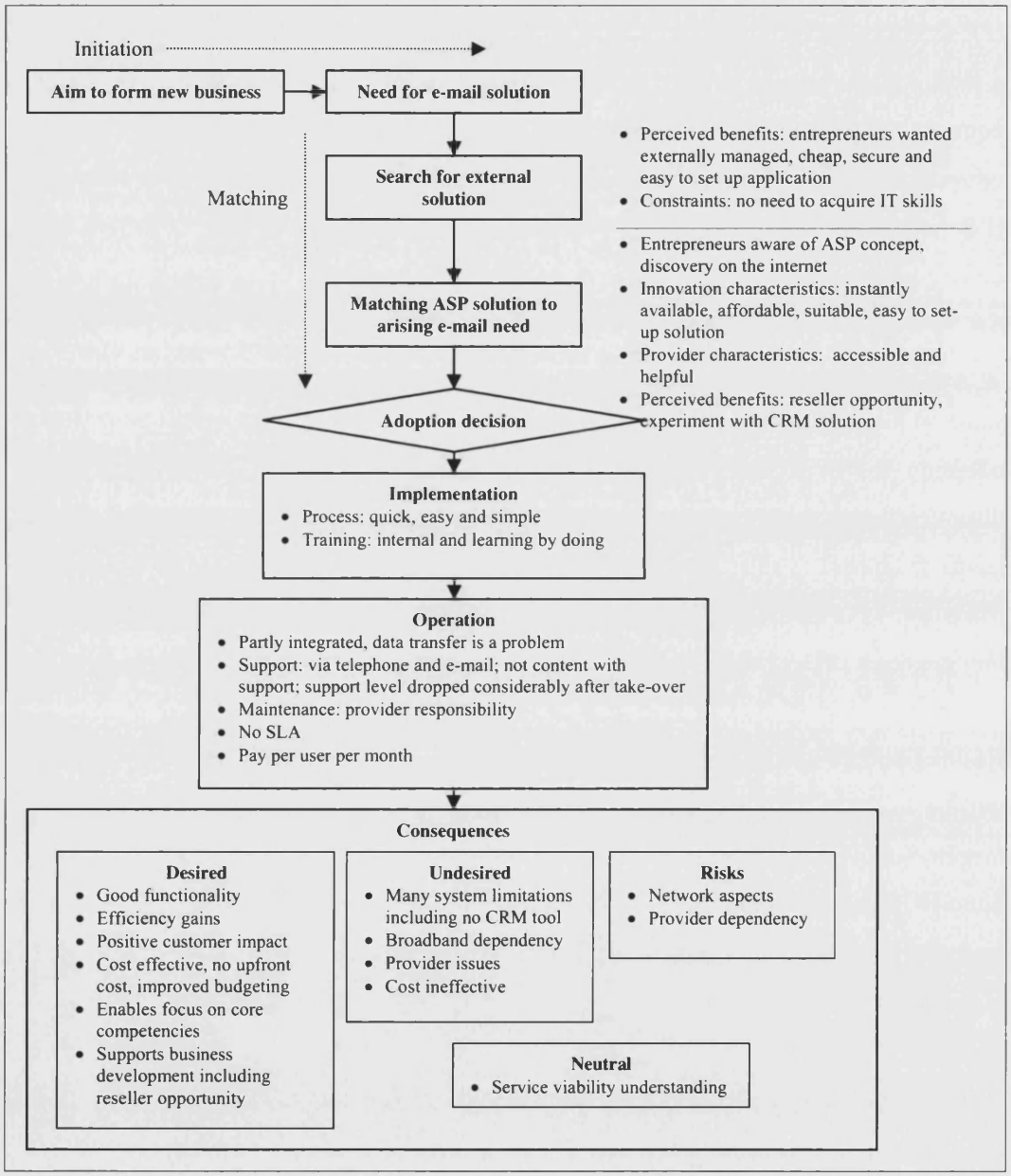


**Figure 19: e-mail diffusion at PB**

At PB the need for an e-mail application did arise because nine entrepreneurs were setting up a new firm. For this new firm, the entrepreneurs needed an application that

would enable communication via e-mail. Thus, the need for e-mail did arise when PB was set-up. The situation was similar at AQO as they needed the e-payment solution when the firm was set up. However, while AQO could not have started without the e-payment solution, PB implemented the solution three months after the firm was set up. The solution at KBC was implemented in April 2003, more than one year after the firm was set up in January 2002. KBC needed the application because it was developing an e-commerce branch of the business.

Previous experiences motivated the PB entrepreneurs to search for an external solution: they wanted an externally managed, cheap, secure and easy to set up e-mail application. These perceived benefits were complemented by knowledge and resource constraints: externally sourcing an e-mail application meant that the entrepreneurs did not need to acquire IT skills. Whereas the owner of AQO did lack skills and resources in the first place and thus was forced to look for external help, PB decided to look for an external solution to avoid having to acquire extra IT skills. However, both firms were motivated to search for an external solution by perceived benefits and constraints.

One of the entrepreneurs discovered the provider Netstore in an internet search. The partners did specifically search for ASP applications because some of the entrepreneurs were aware of the ASP model. The partners chose the solution from Netstore, an accessible and helpful provider, because it was instantly available, affordable, suitable, and easy to set-up. The provider also offered a reseller opportunity and the solution was presented as a CRM tool, which PB wanted to try. Affordability, suitability and easy set up are innovation characteristics that also motivated AQO and KBC to adopt their respective ASP solutions. Reseller opportunity and CRM experiment are factors relating to the specific e-mail application and provider that PB adopted. The decision to adopt the specific ASP solution was additionally influenced by provider impression and reputation at PB and AQO. Whereas KBC's business partner discovered the solution, PB and AQO found their respective ASP solutions through internet searches. The decision to adopt the solution was made by the nine partners of PB.

Implementation of e-mail was quick, easy and simple, like at AQO and KBC. Whereas AQO and KBC did not engage in any training for their e-payment solutions, one of the PB partners did an Outlook training course for the other partners that were not familiar with Outlook. Although training from the e-mail provider is available, PB did not use

this training. Partners and staff at PB were motivated to learn by using the solution, thus learning-by-doing with the help of computer and Outlook literate partners.

At AQO and KBC, the e-payment solutions are fully integrated with the e-commerce application. The e-mail solution at PB is partly integrated in the sense that it is a Microsoft product. Nevertheless, PB users often have problems with data transfer to and from the e-mail application. While AQO and KBC are content with provider support, PB is not: available over telephone and e-mail, the support level dropped considerably when Netstore was taken over by Cobweb. Ever since, PB has been dissatisfied with provider support. Maintenance of the e-mail ASP application is the responsibility of Cobweb, as is e-payment maintenance the responsibility of World Pay. PB pays per user per month. KBC and AQO in contrast pay per use plus a flat fee.

PB identifies seven desired, five undesired, two risk, and one neutral consequence from e-mail ASP. In terms of numbers, PB identifies the most consequences so far. Good functionality and positive customer impact are desired consequences at PB that both AQO and KBC identify. Efficiency gains is a consequence that PB and AQO have in common, as are the focus on core activities that the solution enables and support of business development. Desired financial consequences at PB include cost effectiveness, no upfront cost and improved budgeting. Reseller opportunity is a desired consequence that only PB identifies. Of the five undesired consequences at PB cost ineffectiveness is identified by AQO and KBC, and provider issues are identified by AQO. System limitations, broadband dependency and no CRM tool are undesired consequences specific to PB. The risk consequences are network aspects and provider dependency. Neither AQO nor KBC have mentioned these two risks specific to the ASP mode of delivery and the outsourcing character. PB is the first micro firm that identifies a neutral consequence, the understanding that at a certain cut-off point, it will be viable to stop using an ASP service and develop, buy or rent another e-mail application.

## 6.4 E-SMS diffusion at TA

TA, the IT service provider from West Wales, uses an e-SMS ASP solution since summer 2002. The manager of TA had discovered e-SMS during his constant search *'trying to find better ways of doing things; trying to improve on what we do; and trying to be more effective in delivering our service'* (TA-2, CD). Following *'research into*

*online texting services'* (TA-2, CD) the manager decided to trial such a service. In summer 2002 TA trialled an integrated text messaging version for one month. The specialist text messaging provider 2SMS supplied this solution. The provider *'opened a trial account which included a few free text messages'* (TA-2, CD). TA used the solution to send text messages to potential customers that were *'registering on a database. Every time somebody registered, they automatically got a text message from the database saying thank you for registering'* (TA-2, CD). During the trial, the solution was fully integrated with the Microsoft Access database that contains the customer information and the firm's Microsoft Outlook e-mail client. The integration process was *'relatively easy'* (TA-2, CD). While the 2SMS solution has this integration option, it can also be used on a pay-as-you-go basis: *'you can go to their website, type in a number and a message, and out it goes'* (TA-2, CD).

The trial revealed that the e-SMS ASP solution *'is a very simple and good system'* (TA-2, CD) that has a positive impact on TA customers: *'things like that really influence our service'* (TA-2, CD). Another perceived benefit is that text messaging *'is cheaper'* (TA-2, CD) than a phone call and it enables TA staff to be more efficient: *'rather than spending half an hour phoning everybody up, we can send a text message from a computer without having to send somebody outside in the car park with a mobile and send texts all day'* (TA-2, CD). Thus the manager decided to adopt the pay-as-you-go version of the e-SMS ASP solution. Upon investigation of the reasons for using an ASP service rather than another option for e-SMS, the manager stated that *'we don't have the capacity to deal with it; no way could we do that ourselves. Technically we could never do it; it is too complicated; it is just not feasible at all'* (TA-2, CD).

As the solution has been trialled previous to adoption, it was already implemented. The original implementation was easy and the solution was very simple to set up. There is no training available from the provider. All the information needed is available from the provider's website. However, TA is an IT services provider and as such computer literacy is in-house.

2SMS charges TA 10p per text message but TA can buy different numbers of messages pre-sending. With these so-called message credit blocks, cost per text message decreases with increasing number of texts bought in a block. While the solution was integrated with the respective in-house IS during the trial, thereafter it is a standalone

pay-as-you-go application. Support from the provider is good: *'2SMS are very helpful' (TA-2, CD).* The provider offers a telephone helpline, yet TA has never used it *'we didn't really need to phone them at all'* (TA-2, CD). Maintenance of the text messaging solution is the sole responsibility of 2SMS. TA has no specific contract or SLA with 2SMS.

TA experiences desired, undesired and risk consequences from the e-SMS solution. A desired consequence is good system functionality: the application is a *'very good simple system that works within seconds of pressing the submit button'* (TA-2, CD). Other desired consequences include that TA's technicians are able to realise efficiency gains through *'making more use of their time and having reduced reaction time'* (TA-2, CD); and there is *'less communication costs'* (TA-2, CD) as the cost of an e-text message is lower than the cost of a telephone call. The solution also has a positive impact on TA customers: there is *'better customer support and better customer information'* (TA-2, CD). The e-SMS solution further supports business development as it assists TA's aim to shift the business focus from IT hardware reseller to IT support provider: *'we want to do more support, less TIN, and I hope that this will help it along the way'* (TA-2, CD).

While e-SMS is cost effective in comparison to a telephone call, it *'has increased cost slightly, depending on the texts and the number of texts you send'* (TA-2, CD). This undesired consequence is paired with the risk of spam for TA customers: *'I'm just worried whether at some future point text becomes another channel for spam like e-mails'* (TA-2, CD). The dependency on a third party provider for security *'how secure it is'* (TA-2, CD) is another risk as is the issue that text message and customer information is in the hands of a third party: *'they may sell our customer numbers on to someone else who will then text all this text messaging that you don't want' or the numbers are stolen'* (TA-2, CD). Figure 20 presents the e-SMS process at TA.

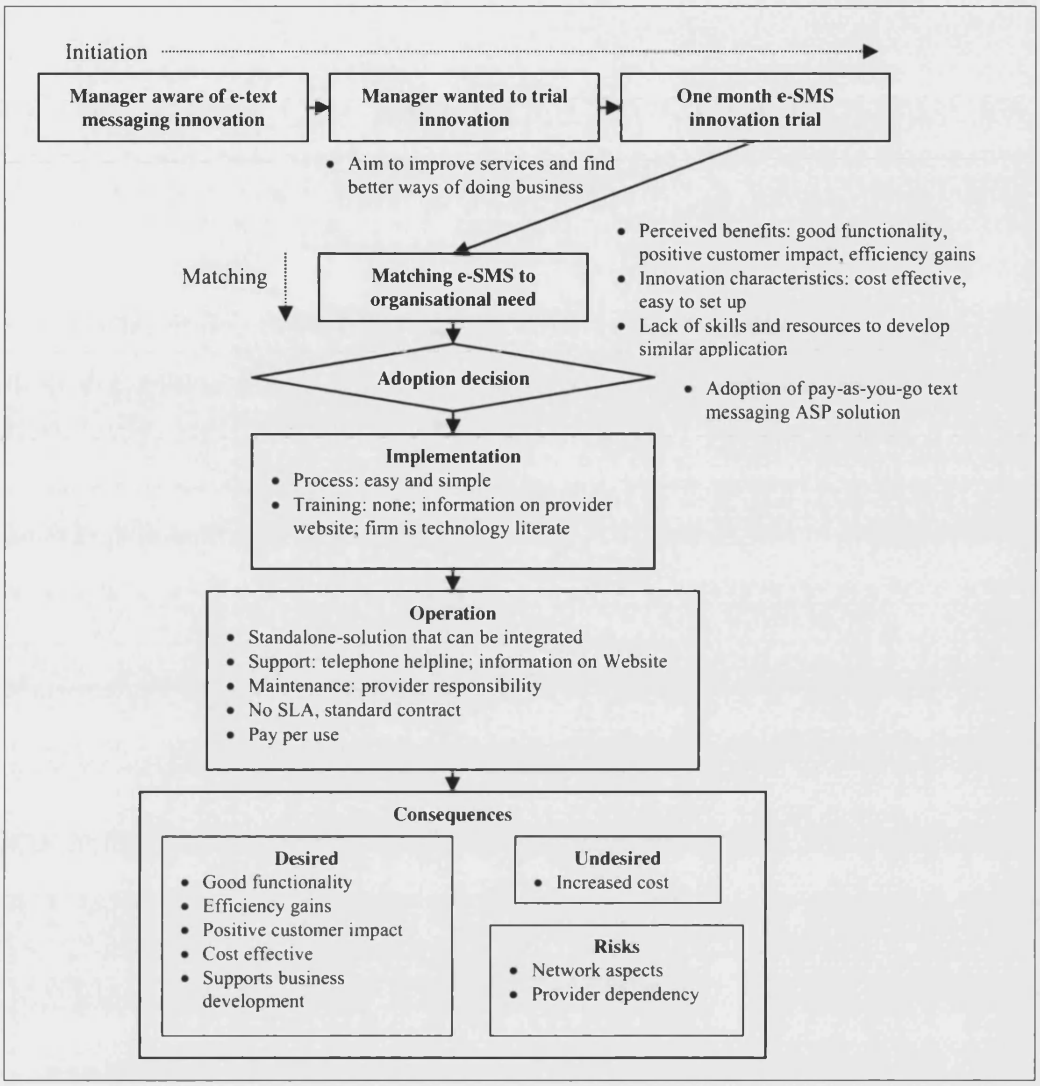


**Figure 20: e-SMS diffusion at TA**

Whereas PB, KBC and AQO are start-up firms, TA has been trading for more than four years. Adoption initiation at TA is very different to AQO, KBC and PB. The manager of TA became aware of the e-text messaging innovation and wanted to try it. 2SMS, a specialist text messaging ASP provider, offered the manager of TA a one month trial. TA did exploit this opportunity and trialled an integrated version for one month. Following this trial the manager of TA determined that there was an organisational need for such an innovation and he decided to adopt the pay-as-you-go version of e-SMS. These initiation stages are very different at AQO, KBC and PB where an organisational need initiated the search for an externally sourced application. An ASP-based application was then matched to the organisational need. While initiation and matching stages at TA are different to the other three firms, implementation and operation are very much alike in the four firms: TA also reports an easy and simple implementation

process. As an IS services provider, TA has a pool of computer literate employees. There was no training at TA and all necessary information is available on the provider website. In terms of operation, the e-SMS solution is a standalone solution that can be integrated. 2SMS offers a telephone helpline to their customers and very good information on their website. Solution maintenance is the responsibility of the provider. TA and 2SMS have no SLA, just a standard contract. The consequences that TA experiences from e-SMS are again similar to the other firms: Good functionality and positive customer impact are desired consequences in all four firms. TA further identifies efficiency gains like PB and AQO; and cost effectiveness like PB. The remaining desired consequence at TA is that the e-SMS solution assists shifting the businesses' focus from IT reseller to IS services provider; thus supporting business development, a consequence identified by AQO and PB. These five desired consequences at TA are complemented by the undesired consequence of increased cost and the risks that come with network aspects and provider dependency. These two risks are identical with risks identified by PB.

The above sections describe and discuss ASP diffusion in the four micro firms AQO, KBC, PB and TA. The following section analyses the findings for each diffusion phase, beginning with adoption, followed by implementation and concluding with consequences.

## 6.5 ASP diffusion in micro firms

This section analyses ASP diffusion in the four micro firms AQO, KBC, PB and TA. These four firms have adopted e-payment, e-mail and e-SMS ASP solutions. World Pay, Netstore/Cobweb, and 2SMS, the respective solution providers are specialist ASP providers: World Pay is the e-payment branch of Royal Bank of Scotland; Netstore/Cobweb focus on providing e-mail functionality; and 2SMS offers e-text messaging. These firms are categorised as specialist ASP providers because they offer one application in various forms to many customers on a rental basis. These applications are provided over the internet. PB adopted e-mail ASP in January 2002, TA has used e-SMS since summer 2002, AQO adopted e-payment in September 2002, and KBC implemented e-payment in April 2003. Following the presentation in Table 12, the following sections discuss the ASP process in the four micro firms.

| Diffusion phase | Diffusion stage | Subject | AQO | KBC | PB | TA |
|---|---|---|---|---|---|---|
| **Adoption** | Initiation | Application need | • E-business formation | • Business development<br>• Government funding available | • Business formation | • Awareness<br>• Perceived benefits<br>• Trial opportunity |
| | Matching | External search | • Entrepreneur constraints<br>• Perceived benefits | • Partner firm responsibility | • Perceived benefits<br>• Skill constraints | • - |
| | | Discovery | • Internet | • By partner firm | • Awareness<br>• Internet | • - |
| | | ASP choice | • Provider characteristics<br>• Innovation characteristics | • From partner firm<br>• Innovation characteristics | • Perceived benefits<br>• Innovation characteristics<br>• Provider characteristics | • Perceived benefits<br>• Innovation characteristics<br>• Lack of in-house skills and resources |
| **Implementation** | Process | Shape | • Straight forward, quick, easy<br>• Test mode option | • Problem free | • Quick, easy, simple | • Easy and simple |
| | Training | Situation | • E-mail and guides only | • None | • Formal in-house<br>• Learning-by-doing | • None<br>• Information on www<br>• Technology literacy |
| | | From provider | • Not available | • Not available | • - | • Not available |
| | | In-house | • Computer literate owner | • Computer literate owner | • Available formal and informal | • Available |
| **Operation** | Integration | Status | • Integrated with e-commerce solution | • Integrated with e-commerce solution | • Part of Microsoft Office | • Standalone<br>• Can be integrated |
| | Support | Method | • E-mail mainly<br>• Telephone | • E-mail<br>• Telephone | • E-mail<br>• Telephone | • Telephone<br>• Information on www |
| | | Satisfaction | • Satisfied<br>• Never any problems | • Satisfied<br>• Never any problems | • Not content<br>• Support level dropped considerably after provider take-over | • Satisfied |
| | Maintenance | Responsibility | • Provider responsibility | • Provider responsibility | • Provider responsibility | • Provider responsibility |
| | Contract | Form | • Standard contract<br>• No SLA | • No SLA | • No SLA | • Standard contract<br>• No SLA |
| | Payment | Method | • Flat fee p.a. and per use | • Flat fee p.a. and per use | • Per user per month | • Pay per use |

**Table 12: ASP diffusion in micro firms**

| Diffusion phase | Diffusion stage | Subject | AQO | KBC | PB | TA |
|---|---|---|---|---|---|---|
| Consequences | Desired | | • Good functionality<br>• Efficiency gains<br>• Positive customer impact<br>• Supports business development<br>• Focus on core competencies | • Good functionality<br>• Positive customer impact | • Good functionality<br>• Efficiency gains<br>• Positive customer impact<br>• Cost effective<br>• Focus on core competencies<br>• Supports business development | • Good functionality<br>• Efficiency gains<br>• Positive customer impact<br>• Cost effective<br>• Supports business development |
| | Undesired | | • Financial burden<br>• Provider issues<br>• Cost ineffective | • Financial burden<br>• Cost ineffective | • System limitations<br>• Provider issues<br>• Broadband dependency<br>• Cost ineffective | • Increase in cost |
| | Neutral | | • - | • - | • Service viability understanding | • - |
| | Risk | | • Exposure to fraud | • Exposure to fraud | • Network aspects<br>• Provider dependency | • Network aspects<br>• Provider dependency |

**Table 12 (cont.): ASP diffusion in micro firms**

### 6.5.1 ASP adoption in micro firms

In micro firms, the sourcing of applications via the ASP model can be instigated by the formation of a new business, the development of an existing business, and by becoming aware of an innovation. In two of the micro firms, AQO and PB, the adoption was prompted by the formation of a new business. Due to the availability of government funding KBC developed the e-side of the company which initiated the need for an application. The situation differs in TA where the manager became aware of the ASP-based application. As TA associated benefits with this specific ASP-based application the firm decided to engage in a free one month trial which instigated the adoption of the pay-as-you-go version of the solution. While TA was already aware of the ASP-based application, the other three firms were not. They, or respectively their partner firms (at KBC), did engage in an external search to find a suitable application that could potentially satisfy the arising application need. This external search was driven by perceived benefits and skill/entrepreneur constraints. AQO and PB found their solutions on the internet. The four micro firms chose the ASP-based applications because of perceived benefits, innovation characteristics, provider characteristics and skill constraints. Additionally, KBC followed a recommendation given by its partner firm and TA would not have been able to develop bespoke application in-house due to lack of skills and resources.

Following the initiation and matching stages of the adoption phase, the owner-managers of the micro firms decided to adopt the ASP-based applications and proceeded to the next stage: implementation of the solutions.

### 6.5.2 ASP implementation in micro firms

All four micro firms associate positive attributes with the implementation process of the ASP-based solutions. Terms used to describe the set-up process include straight forward, quick, easy, problem free and simple. In terms of training on the applications for users, one firm, PB carried out a training course for non-application literate users. This training was done in-house by one of the PB partners. Users at PB were also motivated to learn by using the application. None of the other three micro firms did formal user training. AQO, KBC and TA have computer literate owner-managers and employees. Formal user training for clients is available from one ASP provider only:

Netstore/Cobweb. This firm's customer, PB did not make use of this offer but arranged an in-house session. The internet and internet based-technologies were used by two firms to aid training. AQO found guides on the internet and e-mails from the provider helpful. TA referred to information published on the ASP provider's websites.

The transition from the implementation phase to the operation phase is not clear cut in the micro firms: diffusion was a continuing process. It is unlikely the move from adoption phase to implementation phase where implementation can only follow an adoption decision.

### 6.5.3 ASP operation in micro firms

Operating ASP-based applications on a day-to-day basis poses numerous challenges for micro firms. This study focuses on five issues: integration of ASP applications with other SME information systems; support from ASP providers for SME clients; maintenance responsibilities for ASP applications; contractual agreements between ASP providers and SME clients; and SME payment for ASP-based application services.

Based on the underlying purposes, the ASP applications are integrated with other information systems at the micro firms. The e-payment applications used by AQO and KBC are fully integrated with the e-commerce applications used by these two firms. At PB, the ASP solution is a Microsoft Office product and as such compatible with other Microsoft Office applications; data transfer, however, is often a problem. TA's e-SMS is standalone; an integrated version is available and can be rented from the provider.

Support from ASP provider for micro firm clients is over e-mail, telephone and via information on websites. While three of the firms are satisfied with provider support and two, AQO and KBC, have never had any problems at all with the applications, PB is not content with provider support. Following a take-over of the original ASP provider, the support level dropped considerably. Ever since, PB has been unhappy with the support from this new provider. Maintenance of ASP solutions is the responsibility of the ASP provider; the micro firms do not get involved.

Contractual agreements between ASP providers and micro firm clients are standard: none of the micro firms has a service level agreement (SLA) with its ASP provider.

Micro firms pay ASP providers on pay-per use and pay-per user basis for their application services. Some providers charge their clients flat fees per annum on top of the per use/user cost.

The operation phase co-exists with the consequences phase of the ASP diffusion process. The following section discusses ASP consequences reported by the micro firms.

### 6.5.4 ASP consequences for micro firms

The four micro firms experience desired, undesired, risk and neutral consequences from the adoption of their respective ASP solutions.

Most common desired consequences are efficiency gains and positive customer impacts. All four micro firms report these consequences. Efficiency gains and business development assistance are also common with three firms reporting these effects. Two firms mention focus on core competencies and cost effectiveness as desired consequences. Along with these desired consequences the micro firms experience not-so-positive consequences: undesired financial implications including cost ineffectiveness, financial burden and cost increases. Other undesired consequences arising are provider issues, system limitations and the dependence of the ASP concept on a broadband internet connection. One micro firm, PB identifies a neutral consequence: the understanding that at some point in the future it will be viable to replace the ASP e-mail application with another e-mail application. The remaining consequences are risks that micro firms face as a result of ASP use. AQO and KBC report that their solutions expose them to fraud and in particular credit card fraud. These risks do no relate directly to the ASP mode of delivery but rather to the e-commerce nature of the solution and the association with the third-party involved in the ASP model. These consequences conclude the discussion of ASP in micro firms.

## 6.6 Chapter summary

This chapter analyses and discusses ASP diffusion in micro firms. This type of firms experience four diffusion phases: adoption, implementation, operation and consequences. The adoption phase, which concludes with the decision to adopt an ASP-

based application, is split into two core activities: instigation, where the need for a specific information systems application arises and matching, where an ASP-based application is matched to the arising application need. Hence, ASP-adoption in micro firms needs to be understood from an application perspective and the realisation perspective. Implementation of ASP-based applications, which follows the adoption decision, is perceived problem-free, smooth and quick by micro firms. User training was not a problem for the four firms. Operation issues studied include integration, support, maintenance, contract and payment. This diffusion phase which seamlessly follows on from the implementation co-exist with the consequences phase. The four micro firms report desired, undesired, neutral and risk consequences from ASP-based applications. These consequences originate from the ASP model, the application adopted and the firm. Chapter seven examines ASP in small firms.

# 7 CHAPTER SEVEN: ASP IN SMALL FIRMS

This chapter continues the discussion of ASP diffusion in SMEs by analysing ASP in the small firms ZI, MP, and EMT. These firms have between ten and forty-nine employees. ZI uses an e-mail ASP solution, MP has adopted an e-stats ASP solution, and EMT uses an e-ticketing solution procured via the ASP mode of delivery.

## 7.1 E-mail diffusion at ZI

In late 1998, ZI, the beverage consultancy firm adopted an e-mail ASP solution. ZI adopted this specific solution because it was recommended by a former IT support firm: *'we had a support company at the time - it was a recommendation that they made'* (ZI-2, PM). When this support firm *'did all our support, they did a lot of cabling and supplied a lot of computers'* (ZI-2, PM). When these changes to the IS structure of ZI were carried out, the opportunity did arise to get e-mail. With the support and recommendation of the IT firm, ZI managers decided to adopt e-mail. This e-mail solution is provided by an American firm called Advances.

The IT support firm found the solution and was solely responsible for the installation of e-mail at ZI. The implementation process is thought to have gone smoothly: *'I've not heard of any historic problems. I've never heard anyone mentioning a kind of problem when it was first implemented. So I think it went smoothly or as smoothly as it could have gone'* (ZI-2, PM). Staff at ZI are not aware of user training being carried out when e-mail was implemented. As ZI has an IT department, staff in this department are able to provide IT training.

The ASP solution is integrated with the e-mail chain at ZI. The provider maintains their elements of this chain and ZI is responsible for the in-house elements of the chain: *'Advances are responsible for maintaining the online mail server. We are responsible for our local mail server and all the client machines'* (ZI-2, PM). Provider support is 24 hours via *'telephone, e-mail or ICQ'* (ZI-2, PM). ZI however is not content with provider support as *'they do let us down from time to time. It is fine as long as everything's running normally but if we do get a technical problem then their technical support isn't the fastest in the world and resolution is, in my opinion, longer than it needs to be'* (ZI-2, PM). As Advances is an American firm, ZI pays in US dollars for

the solution. The price of the e-mail solution is included in a Web hosting package. ZI pays $500 per annum for this package.

ZI experiences desired, undesired, neutral and risk consequences from the e-mail ASP solution. Desired consequences are that the users are content with the application: *'in terms of functionality, we're fairly happy with that'* (ZI-2, PM). This good functionality is coupled with cost effectiveness: *'it is cheaper than having our own Exchange server'* (ZI-2, PM). Another desired consequence is that the ASP solution does not expose ZI to Exchange server security threats: *'not having all the security threats that an Exchange server incorporates'* (ZI-2, PM).

The ASP e-mail solution also bears a number of undesired consequences for ZI. System limitations such as usage fluctuations *'it works better in the evening, out of busy periods'* (ZI-2, PM) and routing problems *'it doesn't always pick the intended recipient of an e-mail if the person's address appears on the blind carbon copy line'* (ZI-2, PM) are particularly undesired. Another significant system limitation is time delays: *'the major downside is that it is not instantaneous. This server only connects to the online server every 15 minutes; each client machine then only connects to the internal server every 10 minutes. So essentially there is a 25 minute delay on the e-mail'* (ZI-2, PM). Another issue is e-mail spam: *'there is no decent spam filter for the mail server and at the moment spam is a problem'* (ZI-2, PM). Third party add-ons such as spam filters are not available for the solution *'there are plenty of third party add-ons that you can't get'* (ZI-2, PM). The remaining undesired consequence, identified earlier, is that ZI is not content with the support offered by the provider.

Using ASP-based e-mail bears risk consequences for ZI. The network aspect is a risk *'it is reliant on quite a few different bits of chain really'* (ZI-2, PM) as is the dependency on a third party for a critical business application: *'if it goes down then one of our major matters of communication is being affected - a lot of what we do is reliant on communication through e-mail'* (ZI-2, PM). Another risk relates to loss of information as a result of system aspects: *'because of the routing problem, it doesn't always pick up the intended recipient and an e-mail may go missing'* (ZI-2, PM). Other system aspects that carry risks are spam, *'both in terms of offensive content and shear quantity of it'* (ZI-2, PM) and delays in receiving e-mails *'if it is an urgent one that we're awaiting there is up to 25 minutes delay'* (ZI-2, PM).

ZI understands that at some point in the future it will be feasible to replace the existing e-mail system with an Exchange server. The current system is *'historical and at some inevitable stage in the future we will be going to Exchange'* (ZI-2, PM). This understanding is a neutral consequence. Figure 21 presents the e-mail process at ZI.

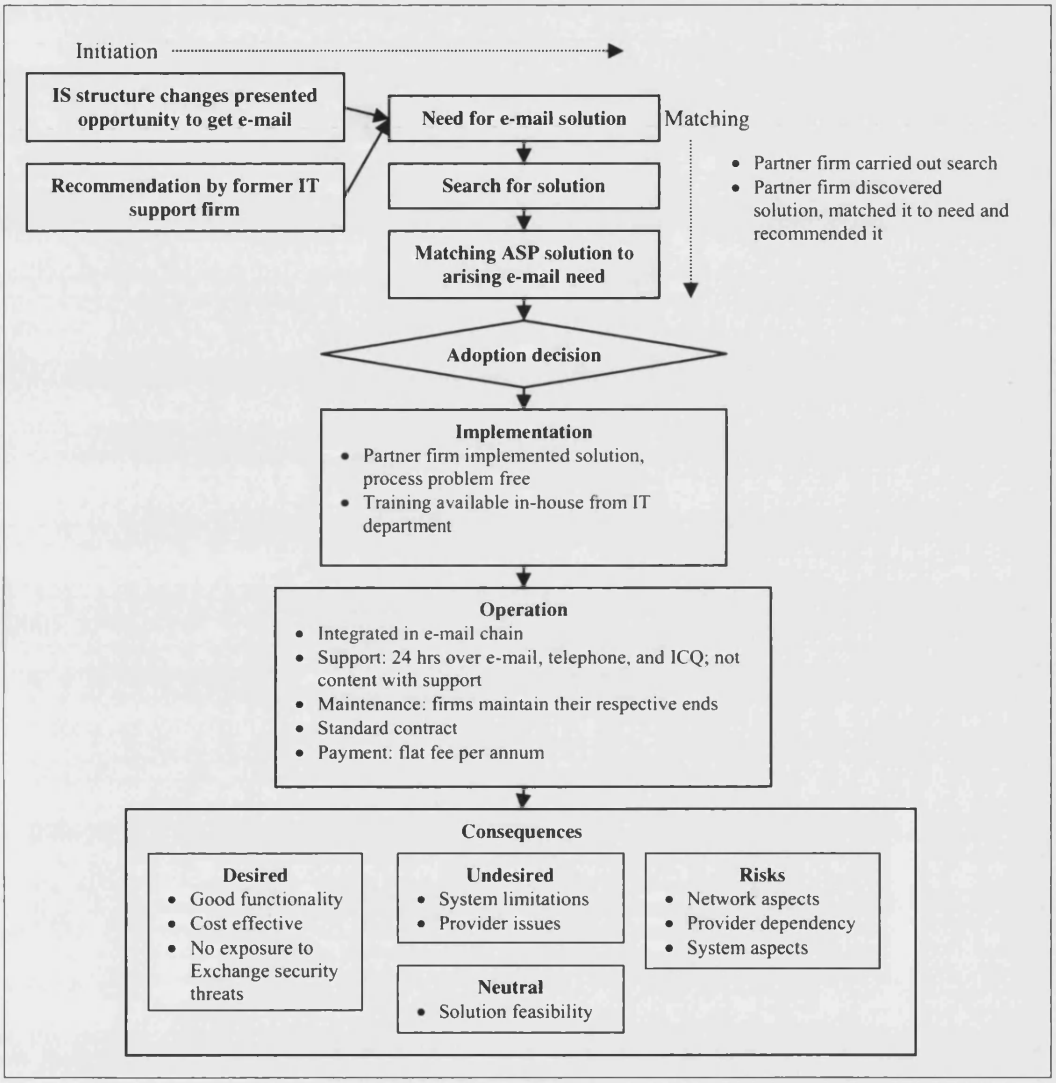


**Figure 21: e-mail diffusion at ZI**

As the adoption and implementation of e-mail at ZI was done back in 1998, the solution is regarded as historical by the firm. The e-mail solution was originally adopted because changes in the firm's IS structure presented an opportunity to get e-mail and the former IT support firm recommended the adoption of e-mail. This support firm did carry out the search for the solution and matched the Advances e-mail application to ZI's e-mail need. The adoption decision was taken by ZI managers back in 1998. Implementation of

the solution was smooth and problem free. Due to the historical context it was not possible to find out whether there was user training. Present IT staff at ZI learned about the ASP solution through learning-by-doing, often having to refer to manuals and current configurations. User training is available from its IT staff. The solution is integrated in ZI's e-mail chain and vendor support for the solution is 24 hours via telephone, e-mail and ICQ. ZI and Advances, the provider, who have a standard contract, maintain their respective parts of the e-mail chain. ZI pays a flat fee per annum for the service.

ZI experiences three desired, two undesired, three risk, and one neutral consequence. The desired consequences are good functionality, cost effectiveness and no exposure to Exchange security threats. Undesired consequences are system limitations and provider issues. Risks include network aspects, provider dependency for critical business application and system aspects. The neutral consequence is that ZI understands that at a certain point in the future, the solution needs to be replaced with an Exchange solution.

## 7.2 E-stats diffusion at MP

MP, the research firm, adopted a website statistical monitoring ASP solution in 2002. Telem@, an IT services firm provides this solution to MP. MP adopted the e-stats solution because senior management of the firm wanted to be able to monitor the performance of the firm's internet presence: *'to see if the website is performing and to monitor its performance and any improvements'* (MP-1, GS). Thus MP needed a website monitoring application. MP approached an IT firm for help because MP lacks skills and resources: *'I didn't have the time to being able to learn'* (MP-1, GS). MP has previously worked with this IT firm, *'they were always very helpful and we have a close relationship with them'* (MP-1, GS). This partner firm carried out the search for a solution and discovered the solution. The partner firm offers the solution to MP on an ASP-basis. Senior management decided to adopt this ASP-based solution.

MP did not notice the implementation of the e-stats application. The solution was installed by the partner firm; there was no involvement of MP required. There is only one user of the application at MP and he did not need any training on it. In case training is needed, the provider *'would give us training'* (MP-1, GS). The e-stats solution is fully integrated with the static website of MP. This website is a standalone IS. Support for the

e-stats solution is fast and informal from the provider and there have been no problems with support in the past: *'fast and informal response cause we're so close'* (MP-1, GS). There is no SLA between the provider and MP, for any work the provider does *'they have to quote it for us; and then they invoice'* (MP-1, GS). MP does not get involved in maintenance; the provider of the solution is responsible for maintenance of the e-statistics solution *'they do any maintenance'* (MP-1, GS). MP pays a fee of £20 per annum for the e-stats solution.

MP experiences desired and risk consequences from the e-stats ASP solution. MP does not report undesired or neutral consequences. Desired consequences include that the good functionality of the solution allows MP to monitor the performance of its website *'it gives us an analysis for usage of the website with hits per page, time spent on each hit, days of the week, and annual-monthly-weekly usage. It gives the search engines which have been used for getting to us and it will draw graphs of usage'* (MP-1, GS); and it illustrates effects that changes to the website have *'it showed an increase after re-design of the website and we're getting about 100 hits per week now'* (MP-1, GS). The e-stats solution also has a desired marketing effect: *'it certainly has an impact on management meetings and managerial presentations about marketing and it impacts website marketing'* (MP-1, GS). MP reports one other consequence which is a risk relating to the network aspect: e-stats is accessed over the Web and is integrated with the firm's website which expose MP to security threats such as hackers. There has been one incident where MP has been maliciously targeted: *'we did have one hacking event on our site'* (MP-1, GS). Figure 22 presents the e-stats process at MP.

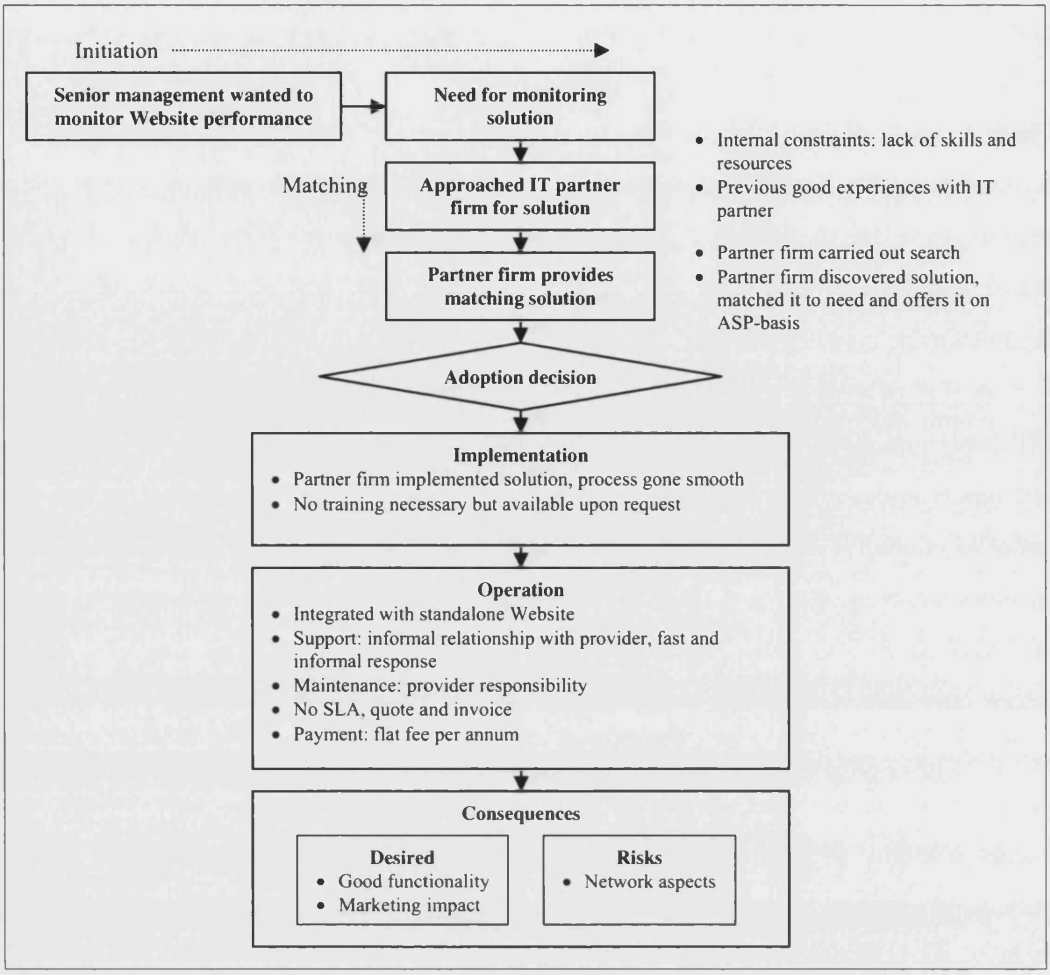


**Figure 22: e-stats diffusion at MP**

The adoption of e-stats at MP was initiated by senior management who wanted to be able to monitor the performance of the firm's websites. As MP lacked skills and resources to search for, and develop, an application needed to monitor performance, the sales and marketing director approached MP's IT partner firm. MP has very good experiences with this IT firm which acts as IT department for MP. This IT firm carried out the search for a solution, discovered the solution, and offers the solution on an ASP basis to MP. Senior management decided to adopt this e-stats ASP solution from Telem@. In the other small firm, ZI, the adoption of e-mail ASP was initiated by an opportunity that arose and the recommendation of a partner firm. In both small firms, the partner firms, both IT service providers, played a significant role in the matching stage of the adoption phase. These two partner firms carried out the search for the solution, found a suitable solution, matched the solution to ZI's and MP's application need, and recommended the solution to the firms. Both small firms followed the recommendation of their partner firms and adopted the solution. While ZI uses a third party provider, the partner firm that discovered and matched the solution for MP also

acts as ASP provider to the firm. The two partner firms implemented the solution at ZI and MP. The process is thought to have been smooth and problem free. While information about user training at ZI is not available, user training at MP was not necessary but is available from the provider. While ZI has an IT department that could organise in-house user training, MP has to rely on its partner firm for IT training.

In terms of operation, the solution at MP and ZI are integrated with the respective in-house IS. At ZI this is the e-mail chain, at MP it is the standalone website. While ZI is not content with provider support, MP, that has a very good relationship with the provider, is content. Advances supports ZI 24 hours over telephone, e-mail and ICQ. Telem@ supports MP over telephone, e-mail and through in-house visits. ZI does not have the opportunity of in-house provider visits as Advances is US based. Telem@ in contrast is based in the same town as MP and thus can offer in-house visits. Maintenance of the ASP solution at MP is the responsibility of the provider. At ZI maintenance is split between the provider and ZI who maintain their respective ends of the e-mail chain. None of the small firms has a SLA with their providers. ZI has a standard contract with Advances; and MP requests quoted and invoices from Telem@. Both firms pay a flat fee per annum to the providers for their respective ASP solutions.

MP identifies desired and risk consequences. ZI in contrast identifies desired, undesired, risk and neutral consequences. One desired consequence, good functionality, and the network aspect risk are reported by both ZI and MP. MP additionally identifies a desired marketing effect.

## 7.3 E-ticketing at EMT

EMT adopted e-ticketing from tickets.com in 2001. The general manager of EMT decided to take up e-ticketing *'because we can see a benefit of doing this'* (EMT-1, PB). First and foremost, EMT aims to *'increase ticket sales'* (EMT-1, PB) and *'one of the things that we are always trying to do is to remove barriers to sales opportunities. A barrier could be that somebody wants to buy a ticket at 3 o'clock in the morning and they can't'* (EMT-1, PB). A 24/7 e-ticketing box office allows customers to book at a time convenient for them and *'it means that we're offering our customers the way they want to do their business rather than forcing them to use telephone or personal booking'* (EMT-3, DA). Apart from these motivators, the customers of EMT wanted to

be able to book online: *'the whole technology boom has meant that people just don't want the hassles that are involved with phoning and telephone queues or parking cars to come in person. It is a natural progression and I think that in time there'll be a lot more online'* (EMT-2, NC).

EMT had to search for an external e-ticketing application as it does not have the skills to develop a solution in-house *'we don't know how to do that. Obviously we'd find someone to do it for us'* (EMT-1, PB). Whilst searching for a solution, EMT discovered that *'we're not allowed to go out onto the free market and get another internet provider'* (EMT-3, DA), *'tickets.com have said they don't allow you to do it'* (EMT-1, PB) - integrate a third-party solution with their box office system. As EMT wanted a real-time e-ticketing solution, integration with the box office was necessary *'we could do unreal time ticketing where someone could just e-mail and request a ticket but they couldn't actually lock into the software program and look at what's available on the screen'* (EMT-3, DA). EMT decided to adopt the tickets.com solution because it was real-time and it is *'a very good system for kind of medium-sized organisations like theatres'* (EMT-1, PB).

Implementation of e-ticketing at EMT was *'not massively complicated'* (EMT-1, PB), but bugged by technical teething problems: *'tickets.com hadn't quite sorted out the processes behind that'* (EMT-1, PB) and there were some early problems getting *'Web links and getting the right Web links'* (EMT-1, PB). EMT had to adapt existing network structures *'in order to get this piece of software to talk to the back of the box office computer, we had to restructure the network and in fact we ended up re-doing the network'* (EMT-1. PB) and get broadband *'now we have a single broadband connection which does the entire building and the box office'* (EMT-1, PB). In terms of training, there was no formal e-ticketing user training at EMT. While tickets.com offers its customers *'lots of courses that you can go on'* (EMT-2, NC) including tailor made courses, EMT staff have not attended these courses. Users learned about e-ticketing though using it, thus learning-by-doing *'it's one of those things where everybody learned together really'* (EMT-1, PB).

The e-ticketing application at EMT is linked with the theatre's website and fully integrated with the box office system, which is a standalone system *'only certain computers have access to the box office; we obviously don't want all people to have*

*access to it'* (EMT-1, PB). Tickets.com supports EMT users *'via the telephone'* (EMT-2. NC) and *'can dial in and sort things out'* (EMT-1, PB). The provider holds *'annual meetings and they do send out newsletters'* (EMT-2, NC). EMT is very satisfied with technical support from tickets.com *'in terms of support they're brilliant because you pick up the phone and they don't even log it and get back to you in an instant'* (EMT-2, NC). Managerial support however is an issue *'it is their managerial point, the development, trying to talk to the sales people support which has not always been forthcoming'* (EMT-1, PB). Another issue is that there is no support for customers booking online *'it is you and the computer; that's a problem'* (EMT-3, DA). Maintenance of the e-ticketing system is split between EMT and tickets.com as both maintain their respective ends: *'there is some things that we have to do, there are some housekeeping tools that we do like we can archive events, clearing batch lists and clearing waiting lists; things that were needed when that show was current but as soon as the show matures all that information is not necessary so you're just clearing out what you created so things like that we maintain in house... in terms of the programming side of it its all done by tickets.com'* (EMT-2, NC). Application maintenance is the responsibility of the provider. EMT customers pay on a pay-per-use basis for e-ticketing: tickets.com imposes a £1 booking fee per ticket. In cases where the ticket is worth less than £10 the booking fee is 60p.

EMT faces desired, undesired, neutral, and risk consequences from e-ticketing. A significant desired consequence is the 24/7 box office which gives EMT customers *'the convenience that they can buy day or night; and people do book at 3 o'clock on a Sunday morning'* (EMT-1, PB). The 24/7 box office therefore improves customer service, removes barriers to sales opportunities and fosters impulse booking *'we never sold a ticket on a Sunday morning before because we didn't have a box office open. We could never sell a ticket after 9 o'clock in the evening and we'd never sold a ticket to someone at home in New York who wants to buy a ticket in their time zone. All those things have happened since we've had online ticketing; just yesterday we sold a party of 14 to a customer in Canada. That is the massive bonus, you're getting to customers who otherwise would have rang a number and got a closed message. The thing with theatre, unless you are desperate to see that show if there's an obstacle that you come across, it can put you off cause it can just kind of fall out of your mind'* (EMT-3, DA). 24/7 e-ticketing is additionally cost effective: *'to be able to have the box office open all night with no staffing costs is fantastic'* (EMT-3, DA).

Another important desired consequence is that e-ticketing has resulted in audience development: *'what we find is there are a lot of people outside of our normal catchment area who book online. We're selling tickets in Canada; we're selling tickets across the world, that wasn't something that used to happen very much at all. I would say the vast majority are within our catchment area but there's 10% who are coming from areas that we wouldn't normally expect our customer base to come from'* (EMT-3, DA). EMT originally thought that *'it was going to be kind of trendy young people who were going to be booking tickets and it hasn't. It has been across the board, a real cross section. A lot of families are booking tickets - our most popular shows are Pantomimes at Christmas and they get a lot of online booking'* (EMT-3, DA).

E-ticketing also has desired marketing effects for EMT: it has improved the theatre's image *'we get a warm glow out of it and we're able to promote ourselves as being vigorous, vibrant and forward-looking. It enhances the perception of the business'* (EMT-1, PB) and *'we're sort of used as a benchmark'* (EMT-2, NC). Marketing strategies have changed: *'we use it much for PR purposes'* (EMT-1, PB) - *'we market the fact you can book online. We tell you in our brochure, on every single page it gives our Web address and the Web poster and obviously it is all over the website'* (EMT-1, PB). E-marketing is now an important marketing strategy at EMT: *'from a marketing point of view the opportunities are endless. We've changed a lot about how we do business because we have a whole database of about 5000 people who we communicate via e-mails about what's on'* (EMT-3, DA). Marketing costs have decreased *'when you think of getting something printed, getting something designed, and then getting it posted the time and the cost of that far outweigh what we do now'* (EMT-3, DA). These cost and time savings from changing marketing strategies are complemented by time and resource savings in the box office department where e-ticketing *'saves us a lot of time because you can be on the phone for 20 minutes if people have a lot a queries whereas online you don't have that at all'* (EMT-2, NC). Other efficiency gains come from different time savings *'we do recognise that 10000 tickets a year sold over the internet probably is 10000 minutes of staff time saved. That's a hell of a lot of time, a big wage saving and it does save time on our telephone system'* (EMT-1, PB). During busy times in the box office *'you get to a call queuing system and instead of, sorry we're all busy at the moment but hold on we'll be with you in a minute, go and book*

*online. There are those kinds of opportunities which may well be taking the pressure off us'* (EMT-1, PB).

Other desired consequences from e-ticketing include competitive advantage for EMT over other theatres: *'the fact that we had online sales meant overseas customers could come here. If the theatre down the road had had it they might have gone there. What was important for them was to have family nights out at the theatre, it wasn't so important where that was so that put us in a market place that we wouldn't otherwise have been'* (EMT-3, DA). As for the overall strategy, e-ticketing is just one step in the theatre's e-development *'the whole thing just kind of snowballed into a much bigger project'* (EMT-1, PB). *'We're looking to expand the number of things that people can buy online: not only will they be able to buy tickets, they'll be able to order their drinks, their ice creams, their programs, any additional merchandise, their car park ticket so the whole experience booked online'* (EMT-3, DA). These horizontal e-developments are complemented by vertical e-developments: *'we now advertise all our jobs and vacancies online, so that's quite a fundamental change. We have available online for download all our education packs for schools, all our technical plans, all the ground plans, drafts and charts about the stage are now available'* (EMT-3, DA).

While EMT is content with the desired consequences, it suffers from undesired consequences. EMT is particularly annoyed by numerous system limitations: *'one of the big problems is that there is no shopping basket'* (EMT-1, PB); *'at the moment it is the old fashioned way whereby for every purchase you have to go through the whole process which is time consuming for the customer and if you want to book a number of shows you have to put your card through x-amount of times'* (EMT-2, NC). Another system limitation *'is to do with concessions. Obviously there are many different concessions available: for old or young, disabled or unemployed, for friends of the theatre. Internet ticketing is restricted to full price senior citizen and children and to no more than 10 tickets per performance'* (EMT-1, PB). The e-ticketing application is further troubled by a ticket reservations glitch *'you can reserve a ticket through the internet booking process and then kind of cancel out of it, but it doesn't quite cancel it'* (EMT-1, PB) and it is affected by *'the occasional crash'* (EMT-1, PB). Lack of integration with other in-house information systems is another problem *'although we do have a kind of e-mail database it's actually a group that just sits in Outlook. There's no sophistication, there's no interaction between our e-mail database and the box office'*

(EMT-1, PB). The e-ticketing user interface is deemed not very user friendly *'users having problems with the system in that they couldn't understand the coding with the theatre. That is just a fundamental problem that creates problems'* (EMT-2, NC).

One major frustration for EMT is that the provider has acknowledged these system limitations but seems incapable of eradicating them: *'we're desperate for a shopping basket and we've been waiting for this shopping basket literally for a couple of years now. We are getting very, very fed up with tickets.com over that'* (EMT-1, PB). Another provider issue is the ongoing dispute between EMT and tickets.com regarding the booking fee: *'there is a lot of debate about how that gets paid for. As it stands at the moment the public pay through a booking fee that goes to tickets.com. The issue of course is that it is a disincentive to buying tickets over the internet because it is more expensive than to buy it over the telephone'* (EMT-1, PB). *'We are obviously in discussion with tickets.com about how we can get rid of that fee; whether there is some licence agreement that is not so odorous to us. Equally, if it all takes off tickets.com is getting £50.000 for a computer that ain't worth £50.000'* (EMT-1, PB); *I've said to tickets.com I will pay you a licence fee but tickets.com have said if you sell 2000 tickets we do get £2000 but we're not going to sell 2000 tickets if we have this booking fee. We've had this conversation, they said we will think about it, we hear nothing more for 4 months and then when we ring them back up again and they say oh yeah we were going to think about that but we're sorry we forgot to, so at the moment they're twiddling that'* (EMT-1, PB). A remaining provider issue is that EMT feels they are not treated well by tickets.com *'we just never ever get answers from them because we are not a priority. They are not that bothered; it's a small bit of their business at the moment'* (EMT-1, PB).

While EMT primarily wants to increase ticket sales, the amount of tickets sold online is minute *'at this moment there is no perceptible increase'* (EMT-1, PB) in ticket sales. *'We've been selling online since the autumn of 2001 and in the whole of that time we've sold approximately 5000 tickets online. It's a tiny percentage of our business'* (EMT-3, DA). The lack of online sales is partly accredited to the booking fee *'if we could just sort out this cost business we can't afford the pound booking fee but tickets.com won't drop it'* (EMT-1, PB).

Besides undesired and desired consequences, EMT experiences neutral consequences. EMT recognises that e-ticketing cannot replace the physical box office *'we're never going to sell all tickets [online]'* (EMT-1, PB). *'You still need a box office front of house, that is not going to change'* (EMT-2, NC) as *'there will always be customers who will want to ask a few questions and chat things through'* (EMT-3, DA). The role of the box office is changing *'a lot of people, when they ring, they've already been online and know what they're looking to book; it's not all brand new information for them, they roughly know what the show is about, they know who's in it, and they just want to book their ticket. Before, you'd have a long conversation so it has reduced the length of time you spend on that one phone call'* (EMT-2, NC).

Business processes in the accounting department and the box office have changed as a result of e-ticketing. For the box office manager *'it hasn't sort of radically changed what I do. I am keeping an eye on web control, that wasn't there before and you have to go online and sort of view your own website and just look for any glitches because you want to spot them before a customer does'* (EMT-2, NC). In the accounting department, there is *'an accounting process that has to happen. When the transaction happens, the money goes to tickets.com and each morning we get a report telling us what the internet transactions have been in the past 24 hours. Every week, tickets.com send us a report saying these are the transactions that have happened and this is the value of those transactions. If we agree with them then they send us the money less the £1 booking fee that they keep to themselves. It is another process really from the accounts point of view'* (EMT-1, PB).

The remaining consequence category is risks. EMT acknowledges that the network aspect is one risk associated with e-ticketing: *'there are a number of links in the chain - there's our box office system here, there is our website, there is tickets.com website, there is communication between all those things so here are there are a number of components that could go wrong'* (EMT-1, PB). Technical aspects such as *'power failures'* (EMT-2, NC) and *'glitches in the software such as something says you've sold all these tickets and then in fact we haven't, or, alternatively, it sells the same ticket twice'* (EMT-1, PB) are system related risks. Other types of risks are credit card fraud *'the whole credit card scenario, are transactions secure?'* (EMT-1, PB) and the alienation of customers when booking online *'if you're sitting at home with your computer and you run into difficulties no one's going to be there from the theatre to be*

*able to sort all that out for you. So, I think, the risk is that customers are going to get very annoyed with you without you being able to do anything about it. If they have a problem when they're here with us in person we can deal with that problem'* (EMT-3, DA). Figure 23 presents the e-ticketing ASP process at the EMT.

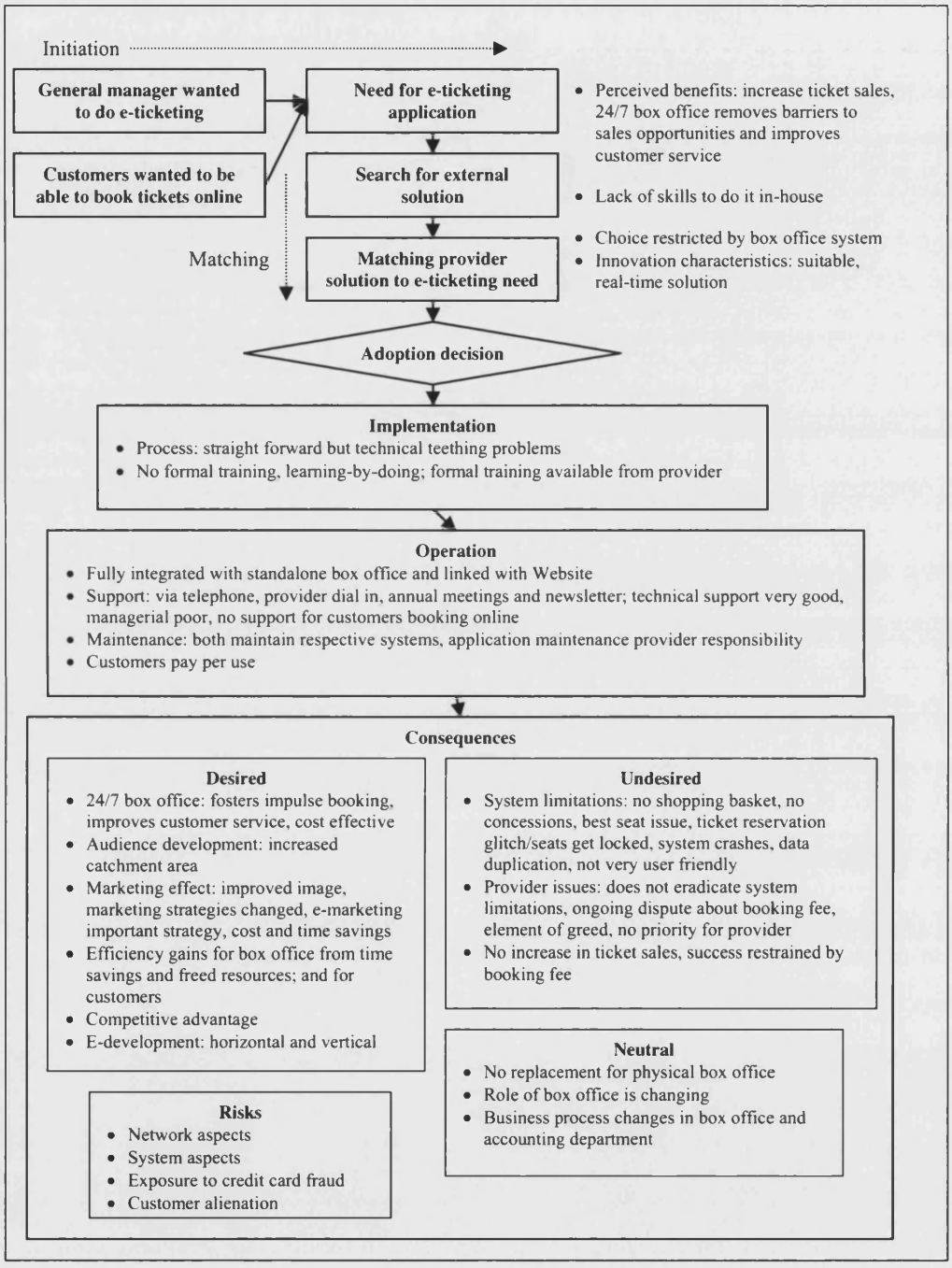


**Figure 23: e-ticketing diffusion at EMT**

ZI adopted e-mail in 1998, EMT e-ticketing in 2001, and MP e-stats in 2002. EMT was motivated to adopt e-ticketing because the general manager wanted to do it and

customers wanted to be able to book tickets online. EMT is the only small firm where customers significantly influenced the adoption of the application. Management at MP and FDL had identified the need for an application. Benefits perceived was a major aspect driving e-ticketing adoption. EMT went to search for an external solution due to lack of skills (one of the factors influencing MP's decision) but was restricted in choice by existing systems and providers. The other two small firms did not have these restrictions but were significantly dependent on partner firms for identifying and matching solutions to satisfy the arising application needs.

Whereas ASP solution implementation at ZI and MP was perceived as smooth and problem free, EMT suffered from technical teething problems. Despite these teething problems, EMT considers e-ticketing implementation to have been straight forward. EMT users did not get formal training on e-ticketing but were learning-by-doing. Formal training from the provider is available but EMT has not used it. The other two small firms have not used training although it is available to them from in-house at ZI and from the provider at MP.

The ASP solutions at the small firms are integrated up to a certain degree. At EMT, e-ticketing is fully integrated with the box office system and links in with the theatre's website. The box office system and website are standalone systems. At MP, e-stats is integrated with the standalone website and at ZI e-mail is part of a chain. Whereas MP has an informal relationship with the provider and ZI benefits from 24 hours support via email, telephone, and ICQ, EMT gets provider support via telephone, dial-in and from newsletters and annual meetings. EMT and ZI are not content with provider support. For EMT the issues are that, although technical support is very good, managerial support is poor and there is no support whatsoever for customers booking online. EMT, like ZI maintains their respective end of the system. Application maintenance is the responsibility of the e-ticketing provider. While ZI and MP pay flat fees per annum for the ASP solutions, EMT customers pay per use: a booking fee per ticket of £1 (60p if the ticket costs less than £10) is imposed by tickets.com.

EMT reports four consequence categories: desired, undesired, neutral and risks. The desired consequences are a 24/7 box office, audience development, marketing effect, efficiency gains, competitive advantage and e-development. Only one of these, marketing effect, is reported by another small firm (MP). Undesired e-ticketing

consequences at EMT are system limitations, provider issues and no increase in sales as success is restrained by the booking fee charged to customers. System limitations and provider issues are reported by ZI. MP does not identify undesired consequences. The three neutral consequences at EMT are specific to this theatre and centre on understandings and business process changes. All three small firms report network aspect risks. ZI and EMT are further worried about system aspects that pose risk issues. The two remaining risks at EMT exposure to credit card fraud and customer alienation relate to fact that e-ticketing is an e-commerce solution.

## 7.4 ASP diffusion in small firms

This section analyses ASP adoption, implementation, operation and consequences in the three small firms ZI, MP and EMT. These firms have adopted e-mail, e-stats and e-ticketing ASP solutions. Advances supplies e-mail to ZI, Telem@ supplies e-stats to MP and tickets.com provides e-ticketing to EMT. Telem@ and Advances are IS and IT services provider. Tickets.com is a ticketing software expert that focuses on the entertainment industry. ZI was the first small firm to adopt an ASP solution in 1998, followed by EMT in 2001, and MP in 2002. ZI is the only small firm that has an in-house IT department. This IT department is involved in ASP operation. MP has a partner firm that acts as external IT department. This partner firm is the provider of the ASP solution. EMT sources information systems, technology and services from various third-party firms and individuals. Table 13 summarises the ASP diffusion process in the three small firms. The following sections discuss the diffusion of ASP in small firms in detail.

| Diffusion phase | Diffusion stage | Subject | ZI | MP | EMT |
|---|---|---|---|---|---|
| **Adoption** | Initiation | Application need | • Opportunity<br>• Recommendation | • Senior management wanted it | • General manager wanted it<br>• Customer pressures<br>• Perceived benefits |
| | Matching | External search | • Partner firm responsibility | • Lack of in-house skills<br>• Previous experiences | • Lack of in-house skills |
| | | Discovery | • By partner firm | • By partner firm | • Choice restricted |
| | | ASP choice | • Partner firm recommendation | • From partner firm | • Choice restricted by existing IS<br>• Innovation characteristics |
| **Implementation** | Process | Shape | • Problem free<br>• Done by partner firm | • Smooth<br>• Partner firm responsible | • Straight forward<br>• Teething problems |
| | Training | Situation | • No training done | • Not necessary | • Learning-by-doing |
| | | From provider | • Not available | • Available, not used | • Available, not used |
| | | In-house | • Available from IT department | • Not available | • Not formal |
| **Operation** | Integration | Status | • Integrated with e-mail chain | • Integrated with standalone website | • Fully with standalone box office<br>• Linked with website |
| | Support | Method | • E-mail<br>• Telephone<br>• ICQ<br>• 24 hours | • Informal | • Telephone<br>• Dial-in<br>• Annual meetings<br>• Newsletter |
| | | Satisfaction | • Not content with support | • Fast and informal | • Technical: very good<br>• Managerial: poor<br>• Customers: none |
| | Maintenance | Responsibility | • Respective ends<br>• Application: provider | • Provider responsibility | • Respective ends<br>• Application: provider |
| | Contract | Form | • Standard<br>• No SLA | • Quote and invoice<br>• No SLA | • - |
| | Payment | Method | • Flat fee p.a. | • Flat fee p.a. | • Customers pay per use |

**Table 13: ASP diffusion in small firms**

| Diffusion phase | Diffusion stage | Subject | ZI | MP | EMT |
|---|---|---|---|---|---|
| Consequences | Desired | | • Good functionality<br>• Cost effective<br>• No Exchange threats | • Good functionality<br>• Marketing impact | • 24/7 box office<br>• Audience development<br>• Marketing effect<br>• Efficiency gains<br>• Competitive advantage<br>• E-development |
| | Undesired | | • System limitations<br>• Provider issues | • - | • System limitations<br>• Provider issues<br>• No increased sales |
| | Neutral | | • Solution viability understanding | • - | • Replacement understanding<br>• Individual role changes<br>• Business process changes |
| | Risk | | • Network aspects<br>• Provider dependency<br>• System aspects | • Network aspects | • Network aspects<br>• System aspects<br>• Fraud exposure<br>• Customer alienation |

**Table 13 (cont.): ASP diffusion in small firms**

### 7.4.1 ASP adoption in small firms

The ASP adoption phase in small firms consists of an initiation and a matching stage. During the initiation phase the need for an IS application arises. This arising need can be triggered by opportunities emerging; internal drivers such as owner-manager characteristics and benefits perceived; external pressures from customers; and recommendations from third-parties. Third parties play a vital role in the ASP matching phase in small firms. At two of the three small firms, ZI and MP, third-party partner firms were solely responsible for matching ASP solutions to the arising IS needs. MP specifically put the matching responsibility to its partner due to previous positive experiences with this partner and lack of in-house skills. The ultimate decisions to adopt the ASP solutions recommended by the third-party partner firms did reside with the small firms. While external search, solution discovery and ASP choice, the three matching issues in small firms, lay in the hands of third-party partners at ZI and MP, EMT did search for an external solution as a result of lack of in-house skills. Whilst carrying out the search, EMT discovered that its choice of e-ticketing solutions was severely restricted by a necessary integration with an existing information system. Because EMT wanted a suitable, real-time e-ticketing application, the solution had to be integrated with this existing information system.

### 7.4.2 ASP implementation in small firms

Two issues relating to the implementation of ASP in small firms are emerging: the process of setting-up the ASP application in the firms; and user training carried out and being on offer from the ASP vendor and in-house sources. ASP implementation was perceived problem free, smooth and straight forward by the small firms. In cases where partner firms are involved, these firms were responsible for setting-up the solutions. Although one firm, EMT, did experience early teething problems, it perceived the overall process to have been straight forward.

The second issue of the implementation phase besides the process of setting up the solution is user training. None of the small firms has engaged in formal user training. While at MP training was not necessary, and no training was done at ZI, users at EMT learned about e-ticketing by using it, therefore learning-by-doing. Although user training sessions are available from two of the ASP providers, tickets.com and Telem@,

the small firms did not use it. One of the firms, ZI has no access to provider training but its users can have training from the in-house IT department upon request. In-house training at EMT is of an informal nature as users help and train each other. Various forms of ASP application user training in small firms are possible: internal training from in-house IT departments and other users; and external training from partner firms and ASP vendors.

### 7.4.3 ASP operation in small firms

Five topics fall into the ASP operation domain: integration, vendor support, solution maintenance, contract between small firm and supplier, and payment methods. The ASP solutions at the small firms are all integrated to some extent with respective information systems. These include the e-mail chain for the e-mail application at ZI, the standalone website at MP, and the website and standalone box office at EMT. Methods of vendor support available to the small firms include e-mail, telephone, ICQ, dial-ins, annual meetings, newsletters and informal assistance. One firm, ZI has access to vendor support twenty-four hours a day. While MP is content with fast and informal support offered by the ASP provider, ZI thinks that vendor support could be improved. Support satisfaction at EMT is divided with technical support being very good, managerial being poor and customer support not being available at all. Maintenance of ASP applications in small firms rests with the ASP providers although two firms, ZI and EMT, report that they have to maintain their respective ends of the systems. Contracts between ASP providers and small firms are standard with MP asking for quotes and invoices. There are no service level agreements between providers and small firms. Small firms pay for their ASP solutions by flat fee per annum. EMT however does not pay for the solution at all: its customers pay on a per use basis. Payment for ASP solutions in small firms therefore can come from external sources paying per use.

### 7.4.4 ASP consequences for small firms

The three small firms experience desired, undesired, risk and neutral consequences from ASP-based applications. All three firms report desired consequences including good functionality and marketing effects. Solution and firm specific desired consequences include cost effectiveness and no exposure to Exchange security threats from e-mail; and 24/7 box office, audience development, efficiency gains, competitive advantage and

e-development form e-ticketing. These desired effects originate from the ASP mode of delivery as well as from the applications themselves. Hence similarities like good functionality and striking differences such as the 24/7 box office for EMT.

Two firms ZI and EMT, report undesired consequences. In both firms these are provider issues and system limitations. EMT additionally mentions no increase in sales. EMT and ZI report neutral consequences in the form of understandings about their ASP solutions and the viability thereof. EMT acknowledges role/business process changes originating from ASP-based applications. All three small firms acknowledge that the ASP based solutions expose them to risks. ASP-specific risks are network aspects, provider dependency and system aspects. Solution specific risks relating to an e-commerce solution are exposure to fraud and customer alienation at EMT.

## 7.5 Chapter summary

This chapter describes and analyses ASP diffusion in the small firms ZI, MP and EMT. The analysis uncovers that ASP diffusion in small firms consists of adoption, implementation, operation, and consequence phases. The adoption phase contains an initiation and a matching stage that can be considerably dependent on third-party firms related to the small firms. The adoption phase terminates with the adoption decision which is followed by an implementation process where the ASP-based solution is set-up and users train on the new applications. While the transition from adoption phase to implementation process is clearly separated by the adoption decision, the operation phase follows from the implementation process in a less clear cut means. Operation topics studied in the small firms include application integration, vendor support, maintenance, contract between parties and payment. The last phase is consequences which co-exist with operation. Small firms experience desired, undesired, neutral and risk consequences from ASP-based applications. Chapter eight presents ASP in medium-sized firms.

# 8 CHAPTER EIGHT: ASP IN MEDIUM-SIZED FIRMS

This chapter concludes the analysis of ASP diffusion in SMEs by discussing ASP in the five medium-sized firms BLT, NWT, TRP, FDL and AT. These firms employ between fifty and two hundred forty nine people. The three theatres BLT, NWT and TRP have adopted ASP-based e-ticketing. FDL uses an e-supply solution delivered via the ASP model and AT used e-mail ASP for one year.

## 8.1 E-ticketing at BLT

BLT adopted e-ticketing in 1999. The provider, tickets.com initially approached BLT looking for theatres interested in e-ticketing: *we were approached by tickets.com, who were asking for volunteers to be a guinea pig'* (BLT-3, LL). BLT's head of marketing *'thought it would be a brilliant idea and he wanted to do it'* (BLT-1, LL). The benefits perceived from e-ticketing were *'to have a new selling fact'* (BLT-1, LL) for the website by developing the theatre's e-activities. The other e-ticketing adoption motivator was to remove barriers to sales opportunities by encouraging immediate ticket purchase *'you can buy a ticket when you look'* (BLT-1, LL). Therefore the marketing manager decided to adopt e-ticketing. The manager opted for e-ticketing from tickets.com because it is real-time e-commerce solution, selling tickets live on the internet *'it is buying a ticket live, so in actual fact if I was somebody booking online now, at the same time it is happening in the box office'* (BLT-1, LL); and BLT has an established good relationship with the provider: *'we've always worked closely with tickets.com. They supply our ticketing software and we've always found them really useful and helpful'* (BLT-1, LL). BLT opted for an external solution because *'we're not very IT minded here and we haven't got an IT department'* (BLT-1, LL). Therefore *'we haven't got anybody in the building that could do that'* (BLT-2, LD) and had to *'get outside help'* (BLT-2, LD).

Implementation of e-ticketing ASP was *'quite quick, only a matter of a few months'* (BLT-1, LL). The box office and its manager were affected the most by the implementation process: *'the box office manager had to do all the set up for that'* (BLT-1, LL). BLT experienced a number of early teething problems with e-ticketing: *'we did have a few teething problems: sometimes it would all go down, and I spent an awful lot of time doing the technical backup of it'* (BLT-1, LL). The biggest problem was that the

system kept *'disabling itself, so we had some nightmares'* (BLT-2, LD). These technical teething problems were eventually eradicated: *'we seem to be fine now'* (BLT-1, LL). BLT did not engage in any formal e-ticketing solution training: *'we weren't given any [training] to be honest'* (BLT-2, LD). Instead, *'it sort of taught me as I went along because as you click on something, this isn't enabled, oh, I must enable that then, so that's the line back really. We got round it together, I think'* (BLT-2, LD). Therefore it was learning-by-doing. When setting up e-ticketing, the box office manager profited from informal, by chance, assistance: *'we had a girl down here, she was giving this training on something else and it just happened to crop up this weekend when we were to go online on Monday. She kind of just said you click on this, that, and the other. No doubt, she sat down with me for half an hour and said this is what you need to do'* (BLT-2, LD).

E-ticketing ASP is linked to the theatre's website and is integrated with the box office which is a standalone IS. Provider support is over the telephone, *'they log the calls so they know how to help me'* (BLT-2, LD). BLT is satisfied with support from the provider: *'all these things that kind of cropped up have really been ironed out when we complained about it. And they always get back to you, even with the simplest of things; they don't expect you to know everything* (BLT-2, LD). In terms of maintenance *'we do the bits that we have here. They [tickets.com] can sometimes fix it online, but other times it has to be me that has to do it'* (BLT-1, LL). Generally, the theatre and tickets.com maintain their respective parts of the system *'if I can rectify it, for example, if it is simply a time out thing, I can go and reset the gateway system. It is only major things, when the whole system went down once, that was the cabling thing that we lost, tickets.com really have to sweep that. If neither I nor LL can mend it we phone tickets.com'* (BLT-2, LD). Application maintenance is the responsibility of the provider. BLT and tickets.com have a standard contract. There is no SLA. The customers of BLT pay a £1.50 transaction fee when buying tickets over the internet. BLT does not pay tickets.com for e-ticketing.

BLT experiences, desired, undesired, neutral and risk consequences from e-ticketing ASP. One significant desired consequence is that e-ticketing enables BLT to sell tickets twenty-four hours, seven days a week, 365 days a year: *'literally, the box office is always open and people can book when we're closed'* (BLT-2, LD) and *'fact is that we actually do sell tickets out of hours'* (BLT-1, LL). This 24/7 box office improves

customer service and fosters impulse booking *'it's a bit like going window shopping on a Sunday: by Monday you've got the bills in, so if you don't buy it there and then, you've lost that booking, you've lost that buyer'* (BLT-1, LL).

Another important desired consequence for BLT is audience development: the theatre has increased its catchment area *'it has opened us up to all over around, rather than just stick to the Midlands'* (BLT-2, LD) and *'we have actually got new audience, it does bring in new bookers'* (BLT-3, LL). BLT was surprised to find that *'families book more for shows than any other audience. Silver surfers also book a lot. We thought we were going to be selling to sort of young trendies but in actual fact, it is mainly families who are booking for family shows'* (BLT-1, LL). With e-ticketing, the theatre's website serves a purpose *'people do go online and look at it. Whether they use the online booking system or not, you know the website has worked'* (BLT-2, LD). From a marketing point of view, e-ticketing has improved the image of BLT *'it sort of brought us into the 21st century. It's made our profile higher, with us being one of the first ones to go online'* (BLT-2, LD). *'Obviously, we're sort of much more in the marketplace'* (BLT-3, LL); and e-ticketing offers e-marketing opportunities: *'it's opened up this marketing aspect'* (BLT-2, LD). Another positive effect of e-ticketing is efficiency gains particularly from time savings in the box office department during busy times: *'it is accessible all day, every day and it's opened the box office more for sales and information'* (BLT-2, LD).

Besides these desired consequences, BLT reports various undesired consequences. A significant issue for BLT is system limitations, which are numerous: the application does not have a shopping basket *'people have to sort of buy one show, then sort of log out, then go back in, and buy another; that's why we want the shopping basket'* (BLT-1, LL); it does not allow more than ten tickets per transaction to be sold *'you can't do ten or more bookings'* (BLT-1, LL); and *'you can't do subscription packages'* (BLT-1, LL). The solution is also not *'as adaptable as we thought it would be'* (BLT-1, LL) and suffers from a ticket reservation glitch: *'sometimes, when people have checked tickets on the internet and haven't closed their end down properly, it locks the seats on; so then I have to phone tickets.com and they have to give me a licence and I have to unlock them'* (BLT-2, LD). A further issue is that there is no alert when there are system problems, *'only really by somebody phoning us and they go, oh I'm trying to book a ticket online and it is coming up with a time out message or whatever, do we know there*

*is a problem. So it is the general public telling us really there is a problem'* (BLT-2, LD). The remaining significant e-ticketing system limitations are the best seat inconvenience and ticket refund problems. Customers cannot choose specific seats but only best seats available: *'the thing that people always ask for, and we still can't do, is picking a particular seat: they thought that they'll be able to pick the seats that they want to sit in, but you can't do that'* (BLT-1, LL). And the solution does not take special needs arrangements into account: if customers wanted *'a box you need to do that through us; and people who need the wheelchair box as well. So if you got a specific need, you need a right hand gangway for a bad right leg, you won't get it'* (BLT-2, LD) online. The other issue is that e-ticketing does not cater for ticket refunds: *'it's a bit of a pig when they want to refund them because tickets.com have got the money at that stage and we're refunding it'* (BLT-1, LL); *'and also we can't actually get into the payment type, so if somebody phones up and says I've got the wrong date or whatever, we have to print the tickets out and then return them'* (BLT-2, LD).

BLT is very unhappy that the provider is unwilling or unable to eradicate these system limitations: *'I don't remember when it was they said they were working on that [best seat issue] but not much sort of come on to it and still it won't give you a seat, you can't pick your seats'* (BLT-2, LD) which is particularly annoying as *'I still think technology is out there to literally go on and show you a plan and you literally click on where you'd like to sit'* (BLT-2, LD). The situation is similar with the reservation glitch which *'they don't seem to be able to address'* (BLT-1, LL). BLT is in ongoing dispute with the provider over the booking fee issue which, along with the seat booking issue, heavily restrain the success of the online ticketing *'I wouldn't have thought we sold more tickets'* (BLT-2, LD). *'I think we would take more bookings online if people could say I want to come on December the 26$^{th}$ and I want a box and be able to book that. I think the inflexibility of booking a seat even puts them off more than the charge of £1.50'* (BLT-2, LD). Additionally, the e-ticketing solution is not always user friendly: *'we did have a few people not understanding how to book tickets online'* (BLT-1, LL).

Besides desired and undesired consequences, BLT experiences neutral consequences. When e-ticketing was adopted, box office staff feared loosing their jobs: *'the girls worried about it because they thought it was going to take their jobs away which it hasn't done'* (BLT-2, LD). The box office manager realised that e-ticketing has not *'cut down on manpower'* (BLT-2, LD) in the box office business unit. BLT has come to

understand that e-ticketing *'doesn't take away any work from the box office because most of our online bookings happen at night or when the BLT is shut at the weekends'* (BLT-1, LL). Therefore, e-ticketing does not have the capability to replace a physical box office *'I can't ever see a time that there won't be a box office with people physically sitting behind a counter because people want to ask questions, they want the old fashioned way, just waiting on the phone to answer and speak to you and me'* (BLT-2, LD). On an individual level, e-ticketing has slightly changed the business processes for the box office manager *'for me personally it's altered slightly how I set up the shows cause I put the shows on the system to go on sale. It is just another five minutes per show, just to click on another button, to go please put on the internet, how many maximum of seats do you want to sell, and things like that. So it hasn't made a great deal of difference to me; it is just something I now do I didn't do before'* (BLT-2, LD).

BLT identifies one risk consequence from e-ticketing which is that customers are alienated when booking online. There is no online support for bookers with the risk being that *'if it's not working, you alienate people and you lose a booking if it's not working'* (BLT-1, LL). Figure 24 presents the e-ticketing ASP process at BLT.

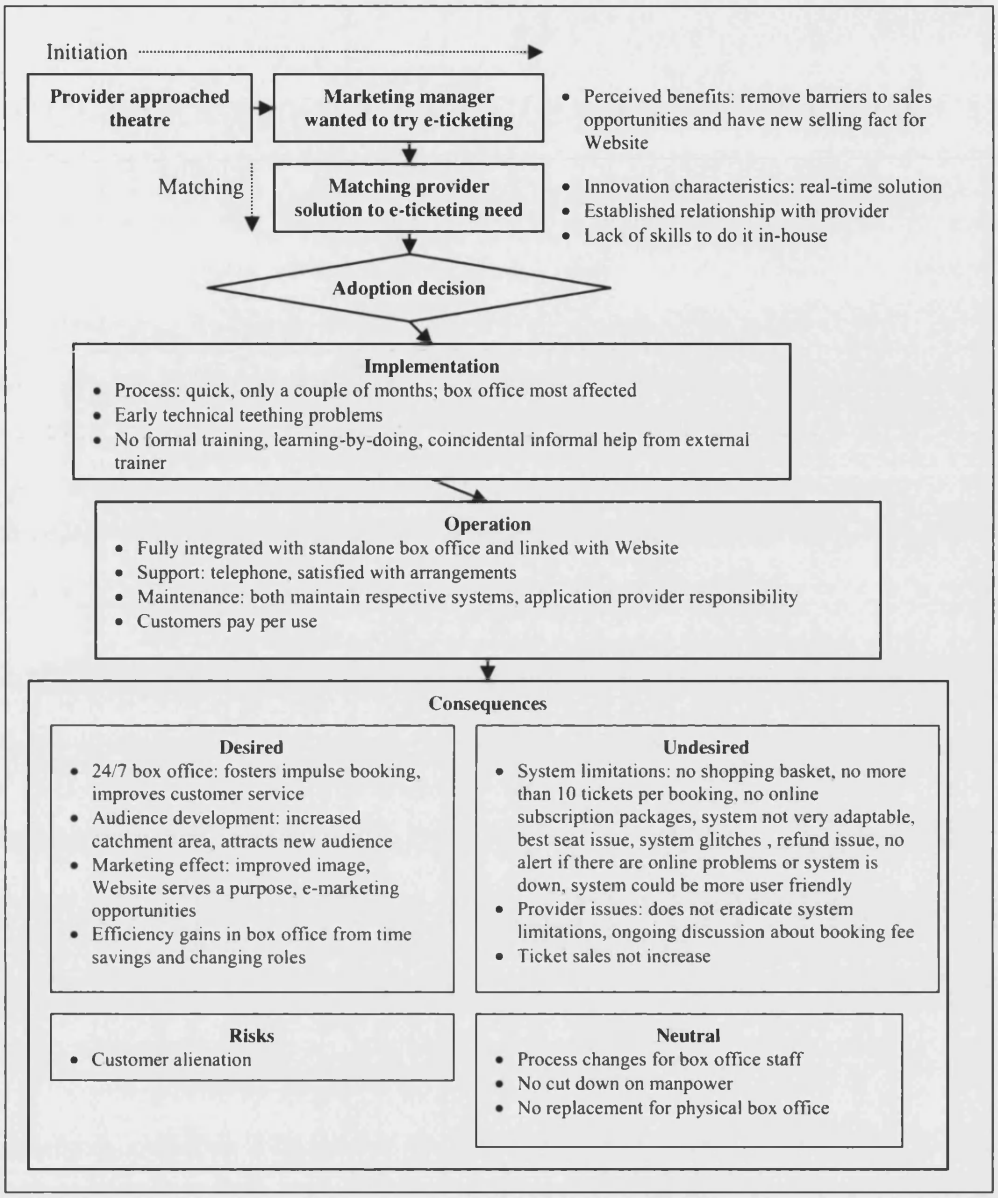


**Figure 24: e-ticketing diffusion at BLT**

At BLT, e-ticketing adoption was initiated by the provider who approached the theatre whilst looking for trial partners. The former marketing manager of BLT wanted to try e-ticketing because he thought it would remove barriers to ticket sales opportunities and it would be a development of the theatre's static website. E-ticketing from tickets.com, the provider who initially approached the theatre was adopted because BLT has a good and established relationship with the provider and the provider's solution is a real-time e-commerce application. BLT opted for an external solution as the theatre does not have the skills and resources to develop and maintain a solution in-house. The adoption decision was made by the marketing manager.

Implementation of e-ticketing was a quick process lasting a couple of months. The box office department of the theatre was affected most. Over the first couple of months, BLT experienced technical teething problems with the e-ticketing solution which were eventually eradicated by the provider. BLT staff did not received formal training on the e-ticketing application. Box office staff who were affected most, learned about the application by using it. The box office manager additionally profited from half an hour informal help from an external trainer. This assistance happened coincidentally. E-ticketing is fully integrated with BLT's box office information system and it is linked with the theatre's website. Provider support is via telephone and BLT is satisfied with support arrangements made by tickets.com. E-ticketing application maintenance is the sole responsibility of the provider, but both firms maintain their respective ends of the system. A novelty is that BLT does not pay for the e-ticketing ASP solution: the theatre's customers pay a booking fee which is pay per use.

BLT experiences desired, undesired, neutral and risk consequences. One of the four desired consequences, 24/7 box office has sub-effects: it fosters impulse booking and improves customer service. Audience development arises from an increased catchment area and the drawing of new audiences from e-ticketing. A desired marketing effect originates from the improved theatre image, e-marketing opportunities and a website that serves a purpose. The remaining desired consequence is efficiency gains in the box office business unit from time savings and changing roles. These four desired consequences are complemented by four undesired consequences. These are system limitations, provider issues, no increase in ticket sales and a not very user-friendly application. System limitations are particularly numerous and include the lack of a shopping basket, no more than 10 tickets per booking, no online subscription packages, system not being very adaptable, best seat issue, system glitches, refund issue, and no alert if there are online problems or system is down. Undesired provider issues are that tickets.com is unable or unwilling to eradicate the numerous system limitations and the ongoing discussion about the booking fee. The risk consequence reported by BLT is that customers are alienated when booking online which could result in the loss of a booking. The neutral consequences are the understandings that e-ticketing cannot replace a physical box office department and that e-ticketing does no cut down on manpower in the box office. The other neutral consequence is that e-ticketing has resulted in some very minor business process changes for box office manager and staff.

## 8.2 E-ticketing at NWT

NWT was *'one of the first venues along with the BLT theatre in 1999'* (NWT-1, AM) to adopt e-ticketing. The theatre's former general manager who *'was very go ahead and look to the future thought that this would be the way forward: the idea was that with computers being readily available in most households it would be a good window of opportunity to bring us into everybody's homes'* (NWT-2, KA). Benefits perceived from e-ticketing adoption included to have a *'24 hour box office'* (NWT-2, KA) which would remove barriers to sales opportunities: *'you don't have to wait for 3 days till the business opens again, you have a 24 hour box office'* (NWT-2, KA). This removal of barriers was seen as potentially increasing ticket sales. The other benefit perceived was marketing opportunities from e-ticketing: *'it costs nothing to send an e-mail apart for my time and we can e-mail 8000 people as opposed to direct mail'* (NWT-1, AM). Apart from these initiators, NWT customers wanted to be able to book tickets over the internet *'our customers demanded it'* (NWT-1, AM) which further motivated NWT to adopt e-ticketing.

NWT was searching for an external, third-party e-ticketing application because the theatre wanted a live and real-time e-ticketing solution: *'in order to do it live, we have to'* (NWT-1, AM) source it externally because the theatre does not have skills or resources to do it in-house although it has an IT department. NWT chose tickets.com because *'it is actually more cost effective for us to do it with tickets.com than go alone'* (NWT-1, AM) and *'we nailed them down for a very good price at the time because we were one of the first trial venues'* (NWT-1, AM). During the matching period, NWT discovered that e-ticketing choices were severely restricted by the existing box office application: live e-ticketing necessarily has to be integrated with the box office. Tickets.com is the vendor of NWT's box office application and as *'part of the licence agreement we have to use their tickets.com system'* (NWT-1, AM). Therefore, it *'was really the easiest route to go down'* (NWT-2, KA) - it also was *'a bow to contention though because they [tickets.com] have a monopoly on the market'* (NWT-1, AM).

Implementation of e-ticketing at NWT was characterised by lots of teething problems: *'many problems were of an administrative nature - sorting out payments from the ticketing software firm to ourselves, and instances where the bank charged customers twice'* (NWT-2, KA); *'we had a lot of problems in the beginning with getting the reports on a regular basis and reports weren't correct'* (NWT-3, MM). Technical

teething problems included *'getting e-mail confirmations and getting every single transaction component'* (NWT-2, KA). The early success of e-ticketing at NWT took the provider by surprise: *'the main problem was that tickets.com underestimated how successful we would be on selling tickets. The line here was too narrow and they had to increase the bandwidth to allow a higher percentage of people to come through'* (NWT-1, AM). There was no formal training at NWT for e-ticketing application users: *'it is through self education really. It's not rocket science anyway. There's no on-site training* (NWT-1, AM), *'it was kind of just pass the butt on type of training'* (NWT-2, KA).

E-ticketing is *'fully integrated with the box office system, it's not integrated with our own PC network; the two are autonomous for security reasons'* (NWT-1, AM). In cases where data needs to be extracted *'we export data from the ticketing system onto our local area network'* (NWT-1, AM). There is also a link from the website to the e-ticketing site. Provider support for NWT is *'minimal; instructions come in form of mails from tickets.com'* (NWT-1, AM). Communication from tickets.com is not ideal *'the line of communication from tickets.com to us is too slow, for instance I've got a show on today that I want to put on sale now and I can't cause I'm waiting for tickets.com for a link'* (NWT-1, AM). Provider support is via e-mail and telephone. In terms of maintenance, the marketing department *'maintain the theatre website. We submit information to them [tickets.com], they populate links and then we embed those links into our site'* (NWT-1, AM). The e-ticketing application is maintained by tickets.com and NWT pays *'an annual maintenance charge of £500'* (NWT-2, KA). NWT pays a licence fee of £1500 to tickets.com for e-ticketing and a merchant charge of 2.2% per transaction to its bank.

NWT experiences desired, undesired, neutral and risk consequences from e-ticketing ASP. One desired consequence is the 24/7 box office which has several sub-consequences: customer service has improved *'people have the freedom to do bookings in their own home'* (NWT-2, KA) *'and can book tickets at their own leisure and their own pace'* (NWT-1, AM); it fosters impulse booking *'anything that makes a customer able to do something spontaneously, you just can't put a price on that'* (NWT-2, KA); and it is cost effective in comparison to staffing the box office 24 hours every day *'it's the cost effectiveness; I think our outlay is like three grand a year on e-ticketing whereas it probably cost about 45 grand to bring that 24/7'* (NWT-1, AM).

Another desired consequence is audience development: e-ticketing has *'opened us up to such a wide audience'* (NWT-2, KA). *'We do see new customers coming along to high profile shows'* (NWT-1, AM) and *'we have had a significant number of people who book from abroad for various events which is great'* (NWT-2, KA). E-ticketing is also having a desired marketing effect: *'marketing techniques have completely changed'* (NWT-1, AM). *'We can communicate with our customers on more frequent basis and on a more cost effective basis: it is lot more cost effective to communicate to people via e-mail than it is towards the post'* (NWT-1, AM). Another marketing effect is that e-ticketing has raised NWT's image: *'it has raised our profile - people want to be associated with us. I'm proud to be associated with a venue that's done it [online ticketing] and as the theatre itself is only ten years old it's been good to be associated with online ticketing'* (NWT-2, KA).

The remaining desired consequence is efficiency gains. E-ticketing *'frees up our phone lines and keeps the service efficient. We have very busy periods when a brochure is just printed and it gives people the option if they find that they can't get through, they can book online. To a certain extent it's released the pressure on the box office sales people so keeps them happy; and it has cut down on the direct mails and freed up box office to do other things'* (NWT-2, KA). NWT reckons that key to e-ticketing success is that there is no booking fee per ticket for customers but a licence fee, which the theatre pays *'it's done on a licence basis not per ticket which is key'* (NWT-1, AM).

The aforementioned desired consequences are complemented by various undesired consequences. System limitations are particularly numerous: *'there's no shopping basket, there's no method of cookies, and the account entry is poor'* (NWT-1, AM). The software causes data duplication *'every time somebody books a ticket they have to enter their account, their address details, if they book 10 times, it creates 10 accounts for one person and they receive 10 e-mails, 10 brochures, or they have 10 different identities so we can't group them'* (NWT-1, AM). Other limitations attributable to the software include the fact that *'there isn't the complete freedom of choice - the customer just chooses within a price range, they can't choose specific seats, it is programmed to pick the best available but you can't actually specify beyond that'* (NWT-2, KA) and that the customer has only 15 minutes to complete an online transaction *'if, for some reason, they go away and leave their computer and it exceeds the 15 minutes, the seats are in a*

*kind of no man's land status as we can't access them to sell and the customer can't come back to them after that 15 minutes* (NWT-2, KA). In cases where seats are locked, *'either myself or the box office supervisor can get in to release them, but that is quite a laborious thing to do and then three days later the same thing happens again. You have to keep on top of that making sure that best seats are always available'* (NWT-2, KA).

Other undesired consequences relate to the provider *'as theatres and venues become more and more successful selling tickets online we do feel there is an element of greed there. Basically, tickets.com would like theatres to pay on a percentage of each ticket sold. Our theory is that it doesn't cost tickets.com any more for their system to counter sell 10 tickets than it does do one, they're just numbers through a computer, aren't they? I think that the theatre industry is most upset with tickets.com over that'* (NWT-1, AM). While, with the current contract, NWT does not apply booking fees for online bookings, tickets.com *'are very keen to introduce charges given that the online ticketing has been so successful* (NWT-2, KA). Tickets.com have a *'monopoly on the market and ironically, even we're the customers, we don't dictate, they can dictate'* (NWT-1, AM). During the online booking process, there is little support for customers *'if people do things wrongly, they're left wondering what to do if it's after the core box office hours time. Sometimes we have had people who have done a booking twice and not realised it for whatever reason'* (NWT-2, KA).

The final undesired consequence is that e-ticketing is a heavy burden for the finance office *'tickets.com put the money in every month but we've got to check that what they are sending through to us is correct. The more people who book, the bigger the report, so it takes you longer to go through and obviously it's more money involved so you got to make sure that it's done proper really. I must ring them and go through any queries which could be resolved and they don't understand that we're still doing queries from 12 months ago'* (NWT-3, MM).

The third group of consequences are neutral. NWT acknowledges that e-ticketing cannot replace a physical box office and that the roles of box office staff are changing: *'you won't loose the box office but the box office will be ticketing facilitators as opposed to ticketing transactions. The criteria for a good box office person is their knowledge of shows; at the moment they don't know anything about the shows cause they haven't got any time. Their ability is purely how to sell a ticket'* (NWT-1, AM).

Another neutral consequence is that for the box office manager *'there are probably a few more strands to the job than there would have been 6 years ago; but changes are for the better'* (NWT-2, KA).

The remaining consequences are risks. NWT considers the affiliation of e-ticketing with credit cards a risk *'one of the big problems which affect all businesses is credit card fraud'* (NWT-2, KA). NWT limits *'the number of tickets that are sold over the internet to prevent any kind of fraudulent behaviour, such as ticket touting'* (NWT-2, KA). Besides fraud, other *'risks are probably coming from the monopoly to mergers in terms of the people that supply our ticketing system. There's only one or two big players and if the entire theatre ticketing industry invests in these companies and these companies go bust or these companies have problems, then you've just undermined an entire industry'* (NWT-1, AM). Dependency on a third-party provider further carries risks such as *'tickets.com pulled out, or if their credit card systems collapsed literally half the venues in the country would loose their online ticketing solutions'* (NWT-1, AM). Figure 25 presents the e-ticketing ASP process at NWT.

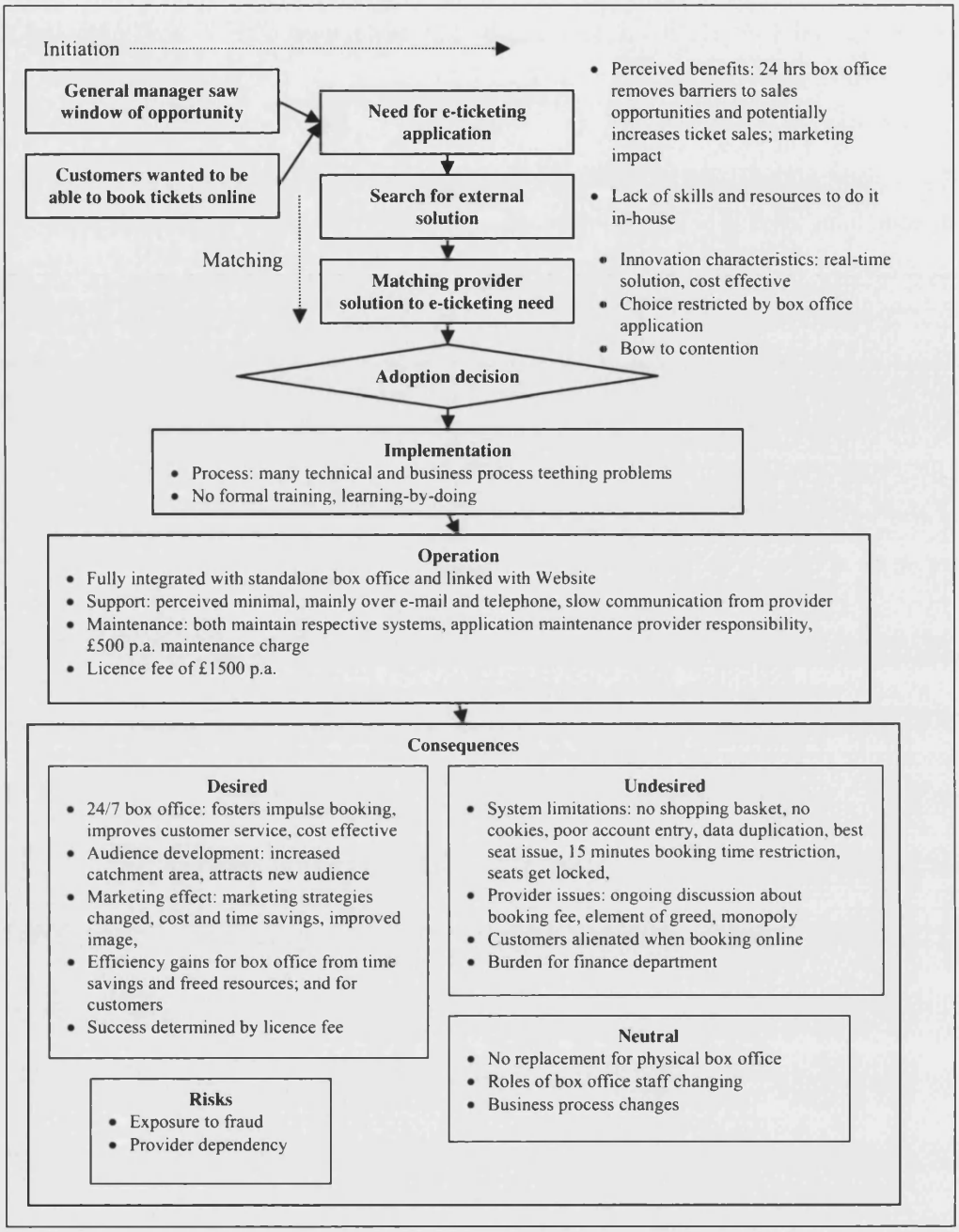


**Figure 25: e-ticketing diffusion at NWT**

NWT and BLT were two of the first theatres to adopt e-ticketing from tickets.com in 1999. Whereas the provider approached BLT looking for e-ticketing trial partners, the general manager of NWT saw a window of opportunity with e-ticketing: it would give NWT a 24/7 box office which would remove barriers to sales opportunities and potentially increase ticket sales. E-ticketing would also have a marketing impact for the theatre. NWT customers additionally reported their desires to book tickets online. As NWT lacked skills and resources to develop an e-ticketing solution in-house, it searched for an external solution to satisfy the arising e-ticketing need. During this matching

stage, NWT discovered that choices were restricted by the provider of the theatre's box office solution that would not allow integration of third-party e-ticketing applications. E-ticketing from tickets.com, the provider of NWT's box office system, incorporated the characteristics desired by NWT: it was cost effective and a real-time solution. The general manager therefore decided to bow to contention and adopt e-ticketing from tickets.com. Whereas at NWT, the general manager is responsible for e-ticketing adoption, at BLT the marketing manager drove adoption. Similarities between BLT and NWT are that BLT's marketing manager wanted to remove barriers to sales opportunities with e-ticketing and wanted to profit from a real-time solution. Lack of skill to do it in-house played a role in adopting an external solution at BLT, as did at NWT. Whereas the tickets.com solution was reviewed during the matching stage at NWT, at BLT the provider initiated e-ticketing adoption.

E-ticketing implementation process at NWT was characterised by numerous technical and business process teething problems. Although BLT suffered from technical teething problems, the overall process at BLT was perceived as quick in contrast to NWT. There was no formal e-ticketing user training at NWT, the users got to know about the application through learning-by-doing. The training situation was the same at BLT, although BLT additionally profited from coincidental informal help. In terms of operation, e-ticketing at NWT, like at BLT, is fully integrated with the box office system and linked with the theatre's website. Provider support via e-mail and telephone is perceived as minimal and slow by NWT. BLT, in contrast, is satisfied with support from tickets.com. While both theatres maintain their respective ends of the e-ticketing system and tickets.com is responsible for e-ticketing application maintenance, NWT pays a £500 maintenance charge per annum to tickets.com and a £1500 annual fee. BLT does not pay for e-ticketing; the theatre's customers pay a fee per use.

NWT and BLT report desired, undesired, neutral and risk consequences from e-ticketing. NWT and BLT report the same desired consequences from e-ticketing: 24/7 box office, audience development, marketing effect and efficiency gains. NWT additionally reports that e-ticketing success is determined by the licence fee that the theatre pays to tickets.com: there is no charge for customers booking tickets online. At BLT, customers do pay a fee per booking. NWT and BLT report four undesired consequences of which system limitations and provider issues are mentioned by both theatres. Many, and similar system limitations are reported by the theatres. Provider

issues at NWT and BLT include the ongoing discussion with tickets.com about booking charges. Besides system limitations and provider issues, e-ticketing is a significant burden for the finance office at NWT. The remaining undesired consequence at NWT is that there is no support for customers booking online. While at NWT this is an undesired consequence, BLT reports that customer alienation is a risk that may lead to the loss of a booking. Risks reported by NWT are exposure to fraud and provider dependency. Neutral consequences at BLT and NWT include the understanding that e-ticketing cannot replace a physical box office and minor business process changes. NWT further realises that roles of box office staff are changing from ticket sales operators to information providers.

## 8.3 E-ticketing at TRP

In December 2003, TRP adopted e-ticketing. With e-ticketing, TRP aims to boost ticket sales *'I personally think we'll get at least 20% increase from sales'* (TRP-4, GT) by rising *'the volume of people we have through'* (TRP-4, GT). Ticket sales are expected to primarily come from a 24/7 box office, audience development and marketing effects. The 24/7 box office removes barriers to sales opportunities *'have access to a box office 24 hours a day'* (TRP-3, LT) and potentially reduces the number of lost calls as customers *'have got another outlet to be able to purchase tickets through'* (TRP-3, LT). A 24 hour box office further fosters impulse booking *'a lot of people say they'll ring back when you're super busy but if you don't have that sale then and there, you're forgotten'* (TRP-3, LT) and improves customer service as customers can book tickets *'there and then'* (TRP-3, LT).

With e-ticketing, TRP tries to attract new audiences *'we're hoping that we're going to attract a new group of attendees, people that wouldn't necessarily come into a theatre. With the internet side of it, we're going to be able to reach these people that are unaware, that think theatres are very stuffy, and all that sort'* (TRP-3, LT) and increase its catchment area *'we have a lot of people who do travel quite a distance to come and see us; hopefully we'll be able to encourage that more'* (TRP-3, LT). Another type of audience development expected is increased accessibility *'the aim of the organisation is to make theatre accessible to all, children and everybody'* (TRP-3, LT).

A positive marketing effect is likely to come from an improved image *'it will make us look more modern and bring us into the 21st century'* (TRP-3, LT) and stimulated press interest *'there will be press interest - we are a very large regional theatre in this area and it's a very big step for us to move forward and do it'* (TRP-3, LT). For TRP, the adoption of e-ticketing is a logical step of online expansion *'obviously now we got our own website up and running, which is very successful, we want to expand from that really'* (TRP-3, LT). Apart from increasing ticket sales and online expansion, TRP aims to realise efficiency gains *'we find that when we have a season start the phones are so badly blocked we spend a lot of time ringing people back'* (TRP-4, GT). E-ticketing offers TRP customers the possibility to *'move to online ticketing'* (TRP-3, LT) and therefore saves box office time.

Whereas the aforementioned perceived benefits motivate TRP to adopt e-ticketing, the theatre additionally faces pressures from its customers, who want to be able to book tickets online *'more and more people wish to be able to buy online and don't expect to have to call or come in person'* (TRP-3, LT) to get theatre tickets. Another pressure is that e-ticketing is a rapidly growing trend in the theatre industry *'you just feel that eventually you have to move with the times'* (TRP-3, LT).

A third-party, external solution was favoured by TRP because of previous experiences with information systems development and maintenance *'there were a couple of failed attempts, like the website that was originally tried to be done in-house. We finally decided to outsource it and get a company who really do know what they're doing. Now the site is built and maintained by them and we have various areas that we can access to update certain bits. It's actually worked out to be the best way and since that's happened we've had very little problems with that'* (TRP-4, GT). TRP went to search for an external e-ticketing solution due to lack of skills *'to go live on your own you will need to know about designing websites, writing software, and design a whole new database. We're not program writers and we do not have any software writers within the company to provide us with that'* (TRP-3, LT). Whilst searching, TRP discovered that application choices were limited as a live, real-time e-ticketing application necessarily has to be compatible with the theatre's box office system. Tickets.com is the supplier of TRP's box office. For every non tickets.com e-ticketing application, TRP would *'need to get permission from tickets.com, which will be exceedingly costly and they'd not agree to because they have their own online ticketing so why attach anyone*

*else's to theirs?'* (TRP-3, LT). Under these conditions, TRP chose the solution as *'its another one of those ones where, unless you go straight to the leaders and pay out for it in the first time, then you're going to not waste money'* (TRP-4, GT). Still, e-ticketing using tickets.com' solution is cheaper than *'manning a box office 24 hours a day'* (TRP-3, LT).

Before e-ticketing implementation, a number of TRP staff *'went up to see a test model they had running from our old data'* (TRP-3, LT). E-ticketing set-up was perceived as being *'slowly'* (TRP-4, GT). While the solution was tested in-house for a full week, *'we had a few teething problems in the first week, like we couldn't find the tickets that we printed'* (TRP-5, LT). One specific problem during the implementation process was the use of jargon *'there's a lot of website jargon involved and nobody within the organisation is a web designer, so it perhaps would have been of benefit to know a smidge more about it to start with'* (TRP-3, LT). Additionally, there were other communication problems *'we could have done things better and part of that is down to purely communication'* (TRP-4, GT). In terms of training, tickets.com has trained TRP staff in a formal training session that took place at the theatre: *'myself, the sales manager here, and some of the box office duty managers have had training. Tickets.com provided the training. They came down here in-house for one day'* (TRP-3, LT). Additional provider training *'can either be arranged to be in-house or they do run training courses at their head office'* (TRP-3, LT). Apart from this formal training, TRP users are learning about e-ticketing through using the application *'they're sort of coming along, we're just getting used to it really'* (TRP-5, LT).

E-ticketing is *'fully integrated'* (TRP-3, LT) with TRP's standalone box office and maintained respectively: *'tickets.com look after their gateway and their server and I look after the box that links the two and the infrastructure this side'* (TRP-4, GT). In terms of support, *'as an overall support package they are very good'* (TRP-3, LT) but in-house support is necessary *'what they normally do is they ring me to see if I can fix it and if I can't fix it then I will liaise with tickets.com to try and fix the problem* (TRP-3, LT). Provider support is *'normally over the phone but follow up support is often by e-mail to send files that they may need to look at and that sort of thing so e-mail and phone are definitely the two main things'* (TRP-3, LT). When booking online, TRP customers pay a 25p ticket charge for the small stage and 50p for the main auditorium plus a £1.50 fee per transaction to tickets.com.

TRP experiences desired, undesired, neutral and risk consequences from e-ticketing. E-ticketing has *'taken off fabulously, we haven't advertised an awful lot regarding this matter, we thought, we would just go quietly, and it has just taken off, we're doing really well, so, we're really pleased on how it's gone'* (TRP-5, LT). Desired consequences include the 24/7 box office which improves customer service as *'there is greater access and people have been buying tickets online at all times really, everything from 7 in the morning before anyone's up right through midnight and later'* (TRP-5, LT) and good system functionality *'we haven't really had any complaints regarding how it is working'* (TRP-5, LT). Another desired consequence is audience development through an increased catchment area: *'we have a wider base of customers; we actually had someone booking tickets online from Germany the other day'* (TRP-5, LT). While TRP is attracting new audiences with e-ticketing, the audience attracted is not the one originally assumed *'we've got from down in deepest darkest Cornwall all the way through the city centre at the moment'* (TRP-5, LT), booking for all types of shows *'right across the board'* (TRP-5, LT) and for all seats and prices *'people have booked all seats, cheap and expensive'* (TRP-5, LT). There has also been a desired e-effect. As a result of e-ticketing, TRP has *'seen a lot more communication via the website in terms of online forms or via signing up to early enquiries. That's generated a lot more business'* (TRP-4, GT).

TRP reports two undesired e-ticketing consequences. One is data duplication in the accounting department, where *'they have to re-key the data'* (TRP-3, LT). The other is provider issues: *'sometimes we feel we need something done instantaneous and we're not up on their priorities list'* (TRP-3, LT).

The neutral consequence for TRP is business process changes. In the accounting department, for example, the accounting practices are changing with the introduction of e-ticketing *'accounts will get the settlement in from tickets.com, minus the fee, so, we have to work out the money we've got, minus the fees, and whether we got the correct settlement into the bank'* (TRP-3, LT).

Risks associated with e-ticketing include credit card fraud: *'one of the main risks is obviously the fraud side of it; any retailer who is using e-retail payments has that threat of fraud'* (TRP-4, GT). System errors are another risk *'the most horrific drawback that*

*we could possibly think will be tickets get double booked or something like that or tickets don't get booked at all'* (TRP-3, LT). Dependency on a third party *'it is something that's out of our control'* (TRP-3, LT) and having to rely *'on the customers to fill in details correctly and select the correct information'* (TRP-3, LT) are other e-ticketing risks. The remaining risk is that the box office and e-ticketing rely on one single computer *'it's obviously in a way eggs in one basket: the whole ticketing system relies on one machine'* (TRP-4, GT). Figure 26 presents the e-ticketing process at TRP.

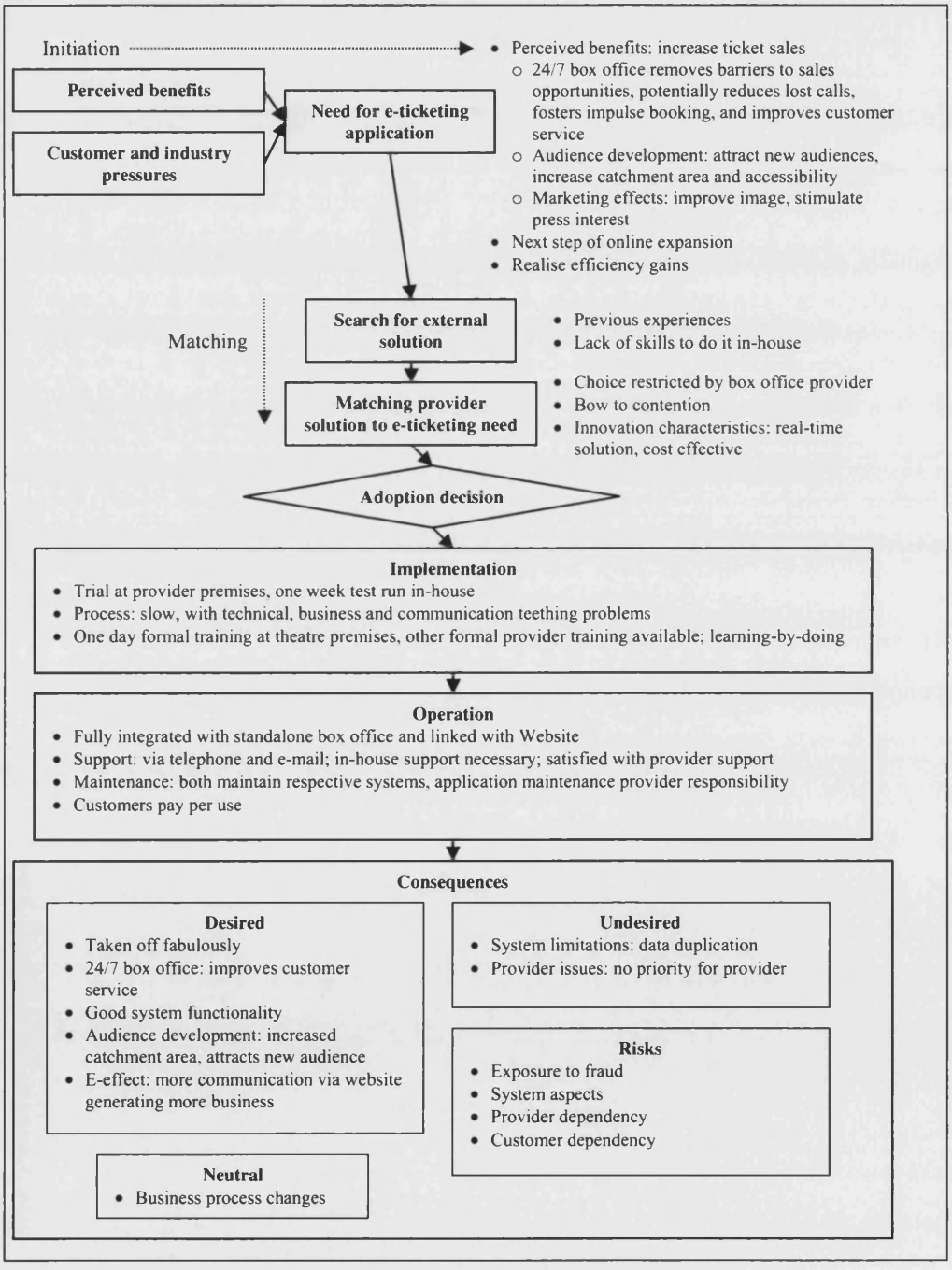


**Figure 26: e-ticketing diffusion at TRP**

TRP was the last of the theatres to adopt e-ticketing in December 2003. TRP was motivated to adopt e-ticketing because of benefits perceived and customer and industry pressures. The core benefit perceived was that e-ticketing could potentially increase ticket sales though a 24/7 box office which would remove barriers to sales opportunities, reduce lost calls, foster impulse booking and improve customer service; audience development by attracting new audiences and increasing accessibility and catchment area; and marketing effects from improved image and stimulated press interest. The two other benefits perceived were to realise efficiency gains and make the next step of online expansion. These perceived benefits resemble desired consequences reported by BLT and NWT. Apart from this lack of skills, the decision to adopt an externally managed solution at TRP was significantly influenced by previous positive outsourcing experiences. For the solution to be real-time, TRP needed to integrate it with the existing box office which restricted the choice of potential suppliers. This situation was the same at NWT. The characteristics of being real-time as well as cost effective did underline TRP's decision to adopt tickets.com e-ticketing application.

TRP is the only theatre that did run an e-ticketing trial at the provider premises and did a one week test run in-house. The implementation process was perceived slow with technical, business and communication teething problems. BLT and NWT also report teething problems. A difference to the other theatres is that TRP users profited from a one day formal training session that took place at the theatre premises and was provided by tickets.com. Although TRP engaged in this initial training session, it has not used any other formal training offered by the provider: users learn-by-doing. TRP's e-ticketing application is integrated with the standalone box office and links in with the theatre's website. E-ticketing application maintenance is the responsibility of the provider. Integration and maintenance responsibilities are the same at TRP, NWT and BLT. Provider support for TRP is via telephone and e-mail. Although TRP is content with the provider's support arrangements, additional in-house support is necessary. TRP does not pay for e-ticketing, its customers pay per use: a £1.50 transaction fee plus 25p/50p ticket charge to tickets.com.

TRP experiences desired, undesired, neutral and risk consequences from e-ticketing. While perceived benefits resemble desired consequences at the other theatres, TRP reports that e-ticketing has taken off fabulously, that the 24/7 box office improves

customer service, that the system has good functionality, that the theatre's catchment area has increased attracting new audiences, and that there is an e-effect from increased communication via the website which generates more business. TRP is the only theatre that reports a desired e-effect, good system functionality and that e-ticketing has taken off fabulously. BLT and NWT identify numerous undesired system limitations but TRP only reports undesired data duplication and one provider related issue (no top priority for provider). The neutral consequence at TRP is business process changes which are also experienced by BLT and NWT. Risk consequences at TRP are exposure to fraud, system aspects, provider dependency, customer dependency and that the system relies on one single computer. While customer dependency and reliance on one computer are risks specific to TRP, NWT identifies risks relating to provider dependency and exposure to fraud.

Following the discussion of the e-ticketing diffusion process at the three theatres BLT, NWT and TRP, the next sections analyse e-supply diffusion at FDL and e-mail diffusion at AT.

## 8.4 E-supply diffusion at FDL

The food and beverage division (F&B) of FDL, one of the largest importers of ingredients for the beverage industry in Europe, adopted an e-supply chain solution in mid 2001. F&B division management decided to adopt this e-supply solution in order to retain a key customer (DK). This solution allows DK to *'manage its supply chain. DK decided that its suppliers had to adopt the solution in order to retain DK as a customer'* (FDL-1, RB). DK *'chose the system' (*FDL-1, RB) and the provider with the aid of a third party consulting firm. FDL was not involved in, nor had any influence on, the choice of solution and provider. WeSupply, a specialist supply chain ASP provider, supplies e-supply to DK and its customers.

Implementation of the e-supply chain solution *'went fairly smoothly and quickly. From subscription, to contract, to use it took about 3-4 weeks'* (FDL-1, RB). Before the solution was implemented two employees of the F&B division attended a formal training day. This training followed the agreement to adopt e-supply: *'once FDL had signed an agreement to adopt the WeSupply solution and had paid, fairly immediately the training took place* (FDL-1, RB). This *'free, quick, and easy'* (FDL-3, RB) training

was done by the provider at DK premises: *'this training took place at DK premises and was provided by WeSupply. About 6-7 suppliers of DK took part at this training. The WeSupply trainers took the participants through the key elements of the solution on a one-by-one basis. The training lasted about 7 hours'* (FDL-1, RB). While this formal training was specifically aimed at first time users, the provider offers *'regular training and revision days for users of their solution. FDL users have not attended any of this training, as it's not clear what can be gained from attending. A solution book complements the training'* (FDL-1, RB). When a new member of staff joined the F&B division, the division manager trained this user *'it was Richard who taught me how to use the DK system'* (FDL-2, JD). About a fortnight after the initial user training at DK premises *'implementation took place'* (FDL-1, RB). Following implementation, the F&B division experienced some teething problems that *'dragged on for about 6-8 months, thereafter the solution runs smoothly and without problems so far'* (FDL-1, RB).

E-supply is a standalone application that is not integrated with existing IS at neither FDL nor the F&B division. When the F&B division needs support for the solution, employees *'tend to approach WeSupply direct if we have a question and DK if we have a problem. WeSupply also offers a helpline'* (FDL-1, RB). For maintenance issues, DK *'is the main contact for FDL'* (FDL-1, RB). In technical terms, *'updates and maintenance is done online at the WeSupply end and tends not to be noticed by us'* (FDL-1, RB). FDL pays a subscription fee per annum for the e-supply solution. In the first year this fee was £1500, including a system set-up contribution.

The F&B division experiences desired, undesired, and risk consequences from the adoption of e-supply. One desired consequence is efficiency gains as the solution *'saves time and admin in that certain functions offered by WeSupply are arguably superior, or at least more user-friendly and thus faster, than the equivalent functions within our in-house system'* (FDL-1, RB). Efficiency gains also come from *'less paperwork and the streamlining and elimination of business processes'* (FDL-3, RB). A significant desired consequence, that was unanticipated at the time of adoption, is the development of a strategic partnership between DK and FDL's F&B division: *'the introduction of the WeSupply solution has led to a strengthened relationship between DK and FDL; the ties are much closer to DK'* (FDL-1, RB). *'We feel that they're linked to us much more closely now, cause we've gone through the effort of subscribing to WeSupply at their*

*request'* (FDL-3, RB). A much desired effect of this strategic partnership is that *'we certainly increased our sales with DK'* (FDL-3, RB), *'they're ordering 5% more'* (FDL-2, JD). DK, for example, *'now approaches FDL, one of its key suppliers, to find out if FDL can source x-product for DK* (FDL-1, RB). Another desired effect of the strategic partnership is that *'because there is a relationship with DK now, price is not the main driver for business any more'* (FDL-1, RB). The remaining desired consequence of e-supply is that delivery planning for the DK customer has much improved: the system is *'up-to-date'* (FDL-2, JD) and includes *'forwards, so we can plan ahead'* (FDL-2, JD). This helps the F&B division to *'avoid any idiotic mistakes like not having stock at the right time; and it allows to buy material in advance which was not possible before, as it was not clear, what the orders from DK will be, if there will be any at all'* (FDL-3, RB).

Apart from these desired consequences F&B experiences undesired consequences. A problematic issue is *'the lack of integration of the WeSupply solution with the existing in-house systems as data needs to be transferred to the in-house system manually'* (FDL-1, RB). This lack of integration fosters data duplication: *'we're running two systems here that do not interface. So you're double keying all the time'* (FDL-3, RB). Another undesired issue is that *'the solution is only nearly real-time and changes are only updated once a day, at approximately 4 pm in the afternoon'* (FDL-1, RB). This system limitation creates problems in the *'order amendment area: when WeSupply amends an order, FDL has to wait until the system updates the data, which takes time. It would be better if updates were done in a 5-10 minutes interval'* (FDL-1, RB).

This system limitation poses the risk of loosing an order as data is not up-to-date: *'sometimes they'll put in an order on Friday night after 4 pm for Monday morning. At 5.30 pm we're all going home without noticing and then on Monday we'll get the alert page and have to see what we can do'* (FDL-2, JD). Another e-supply risk consequence arises from network aspects: *'security is a risk issue* (FDL-1, RB) as are *'any future glitches like network problems - anything where we couldn't access the system'* (FDL-2, JD). A risk specific to supply chain issues is of a legal nature: *'an issue arising are liability questions. What if an order goes wrong, who is liable? E.g. what happens if 100 kg are delivered instead of 10? It is not clear who is liable then'* (FDL-1, RB). While DK is a key customer of F&B, the division has numerous other key customers. Should these other customers decide to adopt an e-supply solution, FDL may be forced

to adopt these solutions in order to retain business with these other key customers. The lack of a standard industry supply chain solution thus poses a risk: *'all these different suppliers of internet-based supply chain management and then you'll end up with a desktop with a 100 icons on it'* (FDL-3, RB). Figure 27 presents the e-supply process at FDL.

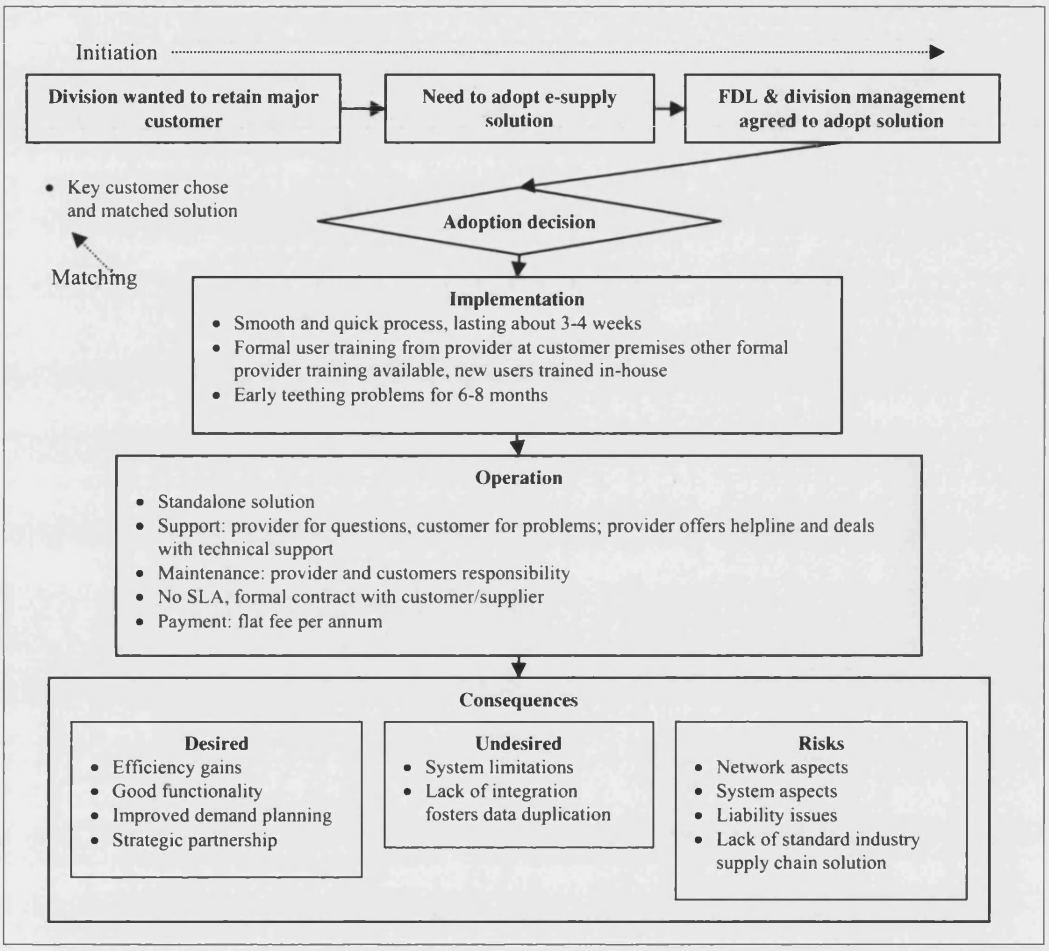


**Figure 27: e-supply diffusion in FDL**

At FDL only one department, the F&B division uses the ASP solution. E-supply adoption initiation at FDL is different to the other medium-sized firms: in order to retain a major customer, FDL had to adopt the e-supply ASP solution. FDL had no say in the matching of the ASP solution which was done by the major customer prior to FDL involvement. Division management decided to adopt e-supply in order to retain business with this customer. Shortly after an adoption agreement was signed by FDL, two members of F&B division staff attended a formal training day at the customer premises. This training was delivered by the provider WeSupply. FDL and TRP are the only firms whose employees have attended a formal training day, organised by the ASP

provider. Just like at TRP, the provider continues to offer regular training days for e-supply users but FDL employees do not attend these formal training sessions. Instead, existing users train new users in-house.

Following the formal training day, FDL's e-supply solution was implemented in a smooth and quick process that lasted about three to four weeks. At TRP training was also done prior to implementation. So far, all medium-sized firms, including FDL, report early teething problems associated with the implementation of the ASP solution. At FDL these teething problems were primarily of technical nature and dragged on for about six to eight months.

E-supply is a standalone solution that is not integrated with any other information systems at FDL. All the e-ticketing solutions, in contrast, are fully integrated with the theatre box offices and link in with the theatre websites. For support, FDL has two points of call: the customer and the provider. The F&B division tends to approach the customer in cases where there are problems and contacts the provider for questions. Maintenance is the responsibility of the provider and the customer; FDL is not involved in e-supply maintenance. While FDL has an IT department it has nothing to do with the WeSupply solution. The heavy involvement of one single customer with the ASP solution is another novel aspect of the e-supply ASP solution not found in other medium-sized firms discussed hitherto. FDL has a formal contract with the customer/provider; there is no SLA. FDL pays a flat fee per annum for the solution. Whereas NWT also pays a flat fee for e-ticketing, at BLT and TRP the customers pay on a per-use basis for the ASP solutions.

The F&B division experiences desired, undesired and risk consequences from e-supply. Desired consequences include efficiency gains for the F&B division and good functionality. Departmental efficiency gains are desired consequences reported by BLT and NWT. Good systems functionality is a desired consequence for TRP. The other two desired consequences identified by FDL are improved demand planning and strategic partnership. These effects have not been identified by any other firm. Undesired consequences at FDL are system limitations and lack of integration which fosters data duplication. The other medium-sized firms do report system limitations including data duplication. Of the four risk consequences that the F&B division reports, systems aspects is the only one that is identified by another medium-sized firm (TRP). FDL is

the only medium firm that mentions risks relating to liability issues, lack of standard industry supply chain solutions, and network aspects.

## 8.5 E-mail diffusion at AT

The mobile information and communication training unit (T-unit) of AT adopted an e-mail ASP solution in February 2002. This solution is provided by Netstore, the same ASP provider that supplies the micro firm PB. While PB still uses the solution, AT discontinued using the ASP solution after one year, in February 2003. This discontinuation is discussed later in this section.

A new project at the T-unit of AT created the need for remote access to e-mail and data: *'I had a new project coming on-stream and because the nature of the job was such that we're all kind of out of the office, I wanted to be able to assign tasks, I wanted to be able to share diaries, and I wanted to be able to share e-mails, contacts, and so on'* (AT-1, PW). The manager of the T-unit initially approached AT's IT department for assistance. The IT department however was not able to facilitate remote access at a reasonable cost: *'everything that I wanted basically came out to a cost of about £10k-£11k'* (AT-1, PW). This initial set-up cost would have been coupled with *'high ongoing cost'* (AT-1, PW). The IT department additionally lacked skills *'these guys were just not up to the job. I couldn't rely on them to get it up and running'* (AT-1, PW). Thus the manager decided to look elsewhere to satisfy the arising IS need. The T-unit manager had *'kind of heard of these ASP providers'* (AT-1, PW). He *'got to know about Netstore and broadband because I did broadband awareness raising - one of the first public/private sector initiatives to put broadband into telephone exchange areas where it wouldn't be commercially viable'* (AT-1, PW). Upon the arising need for an external e-mail application, *'I thought, hold on we've got broadband here! And we could basically have piece of mind, using facilities that we wanted to just get on with our jobs. So I decided to use a service, an ASP provider'* (AT-1, PW). The manager chose Netstore as provider because he *'thought these guys are safe. I think they are the only Microsoft Certified Provider in the UK if not in Europe. So I thought if these are Microsoft Gold Certified provider, they can't be that bad, they are not going to go bust or urbanite'* (AT-1, PW).

Implementation of e-mail ASP was quick, straight forward and very easy for the T-unit. It was *'very easy for us to install; we had a little piece of software and it was there for us'* (AT-1, PW). From initial contact to actual use of the solution it took *'not more than two months'* (AT-2, MD). The process overall *'was very straight forward'* (AT-4, MD). Although T-unit staff are *'used to Microsoft office'* (AT-2, MD), the unit manager organised *'an Outlook top up course'* (AT-2, MD). An external Outlook expert, who holds regular Outlook courses for the T-unit, provided this training. There was no formal training from the provider.

E-mail ASP is a *'standalone'* (AT-3, AJ) application that is not integrated with AT and T-unit IS. The T-unit is very satisfied with service from Netstore: *'the service was really top class'* (AT-4, MD). Support from the provider is *'over the phone and over e-mail'* (AT-2, MD). E-mail application maintenance is the responsibility of Netstore: *'they'd send regular updates and various e-mails and things; all work was done the year round. It didn't affect our work at all if they were shutting down the servers and doing maintenance work, they'd warn you plenty of time in advance'* (AT-4, MD). Netstore and T-unit had a standard contract for *'a minimum of 12 months'* (AT-2, MD). There is no SLA, *'we haven't got a SLA. All we got is the monthly contract for 12 months'* (AT-2, MD). The T-unit paid £20 per month, per user plus an initial set up fee of £700. Three users were set up in February 2002.

The T-unit experiences desired, undesired and risk consequences from the adoption and use of the e-mail ASP solution. Desired consequences include good system functionality *'we could access our e-mail, our contacts, everything from any computer, anywhere in the world'* (AT-1, PW); *'it has been trouble-free'* (AT-2, MD) and *'did work well'* (AT-3, AJ). The T-unit was able to realise efficiency gains predominantly from time savings *'you could place something in e-mail straight away rather than put it down on a piece of paper and going back to the office'* (AT-3, AJ) and resource savings *'there is an elimination of paperwork big time'* (AT-2, MD) and increased productivity *'much more productive really. We didn't have to hold a meeting, we'd just get our task list online and you knew where you were in the morning; I found that very handy'* (AT-2, MD). Another desired consequence is that the solution is cost effective: *'£20 a month per user, £60 a month, peanuts really'* (AT-1, PW). This price includes *'software updates, backups, and virus protection'* (AT-2, MD). Additionally, *'we didn't have to initially buy a server which would have been sort of £5000-£8000'* (AT-2, MD).

Another financial implication is improved budgeting: *'you're paying them a flat monthly rate, you can budget a head'* (AT-2, MD). A different desired consequence is that the e-mail ASP solution allows T-unit staff to concentrate on their core activities *'we didn't have to worry about online backups and we didn't have to worry what happens if things go wrong. It allows us to get on with our job. Anything that goes wrongly they'll sort it out'* (AT-1, PW). The remaining desired consequence is an easy route out *'if you weren't happy with that, you could try another package - you didn't have to stick to the same. So you've had more flexibility in deciding what suits you best really'* (AT-2, MD).

Besides these positive effects, the T-unit discovered a number of undesired e-mail ASP consequences. One of these is the dependency on a physical broadband connection: *'you have to have broadband'* (AT-1, PW) - *'we got analogue lines at home and it is very slow'* (AT-2, MD). E-mail ASP via satellite broadband is not working either *'one might get broadband via satellite but the problem with satellite is you can't take advantage of all services provided by ASP providers because of the latency, the delay'* (AT-1, PW).

The manager, who decided to adopt ASP e-mail, left the company half way through the 12 months contract. Shortly after he left, a new member of staff started to work for the T-unit. When the unit wanted to transfer the manager's old user account to this new member of staff, the provider did not consent to this transfer. *'After Peter finished, we weren't allowed to change his Netstore account to somebody else'* (AT-3, AJ). *'I thought it be common decency - we paid for 12 months, he'd done about 7 months, so we had 5 months there; but they just refused because they said the 12 months was an immanent'* (AT-2, MD). Other undesired provider issues included that *'my account had stopped and it was not supposed to being stopped because we were paying for it'* (AT-3, AJ) and that communication from the provider was inadequate: *'I had no real review in all what Netstore could maybe give us altogether. Maybe there should have been more contact and saying this service is available in doing this and that'* (AT-3, AJ). The remaining undesired consequence is that the solution indirectly resulted in staff displacement *'IT technicians didn't like it because effectively it was putting them out of work. Instead of paying them to look after my server, I was effectively paying some technician in London'* (AT-1, PW).

The final group of consequences for the T-unit are risks from e-mail ASP. Dependency on a third party provider *'when the company goes bankrupt'* (AT-1, PW) is a risk as is the network aspect of the ASP concept: *'somebody can hack in my e-mails'* (AT-1, PW). Another network aspect is the dependency on a network *'I would advise any business, that's going to take up ASP, to have some kind of service level agreement with their broadband provider because if the broadband connection fails then it's not your fault, it is not the ASP's fault, it is your broadband provider's fault'* (AT-1, PW).

In February 2003 the T-unit ended its contract with Netstore and thus discontinued using ASP. This discontinuation is discussed in the following section.

### 8.5.1 Discontinuance of e-mail ASP

The T-unit of AT did discontinue using the e-mail ASP solution after one year in February 2003. The new manager of the T-unit decided to stop using the solution first and foremost because he *'felt there was no need for it to be there'* (AT-4, MD). AT also prefer to have IS provided by the IT department across all units: *'we were like standalone and our technical side of the company really wanted us to be more central to the rest of the company* (AT-3, AJ). Another reason for discontinuance was that e-mail ASP was duplicating services readily available in-house: *'we have got an office rental charge which includes the use of the server* (AT-4, MD). Licences were also duplicated: *'the licence was purchased before we even joined Netstore so we had doubling up really'* (AT-4, MD). Hence, *'it duplicated what was already here'* (AT-5, CD). In the long term, the solution was expensive and cost ineffective for the T-unit *'it was quite expensive in the long run'* (AT-3, AJ) *'it was a lot of cost really for the sort of benefit we were getting out of it'* (AT-4, MD). The provider issues discussed in the previous undesired consequences section played a role in the discontinuance: *'after Peter finished, we weren't allowed to change his Netstore account to somebody else. I think that was one of the main issues with us finishing it'* (AT-3, AJ). Additionally, *'when our second year contract with the ASP company came up, I thought we were maybe in line for a cheaper rate because we tell businesses about this, basically selling it for them. But they didn't really see that themselves'* (AT-4, MD). However, once the provider discovered that T-unit was going to terminate the contract *'they offered us a second year rate which was much cheaper than what we initially started off on. They kept phoning us up with price deals and different prices and structures; 'the second year code was*

*down to about £12 or £15'* (AT-4, MD) per user per month. The first year rate in comparison was £20 a month a user.

Transition from e-mail ASP to in-house e-mail was problem-free *'we just removed Netstore, no difficulties, no problems'* (AT-5, CD). All that needed doing was to move *'the content of one PC to our server and synchronise with that server'* (AT-5, CD). Desired consequences for T-unit staff from discontinuation of e-mail ASP include freed resources - financial *'their e-mail is going back to our server, because that was going to buy something else'* (AT-5, CD) and hardware *'that PC now becomes spare. It is another piece of kit that they can use'* (AT-5, CD). The relationship between T-unit and IT department improved considerably as a result of discontinuance *'there's a good relationship really between all the divisions now'* (AT-3, AJ). Undesired consequences are the loss of efficiency *'I found really handy the e-mail point of view. I could just go into it and find my e-mails anywhere, whenever I wanted; so it was much more efficient'* (AT-3, AJ). Overall, e-mail ASP was a valuable experience for T-unit, which would not hesitate using an ASP solution again. *'The ASP solution was a big learning curve for everybody involved. The service was good, problem free and very little hassle at all. Without doubt, it worked, it will work and it will be a cost saving service that future generations will definitely take on board especially with the updates and upgrades; you're avoiding all of those problems for a flat fee* (AT-4, MD). Figure 28 presents the e-mail process at AT.

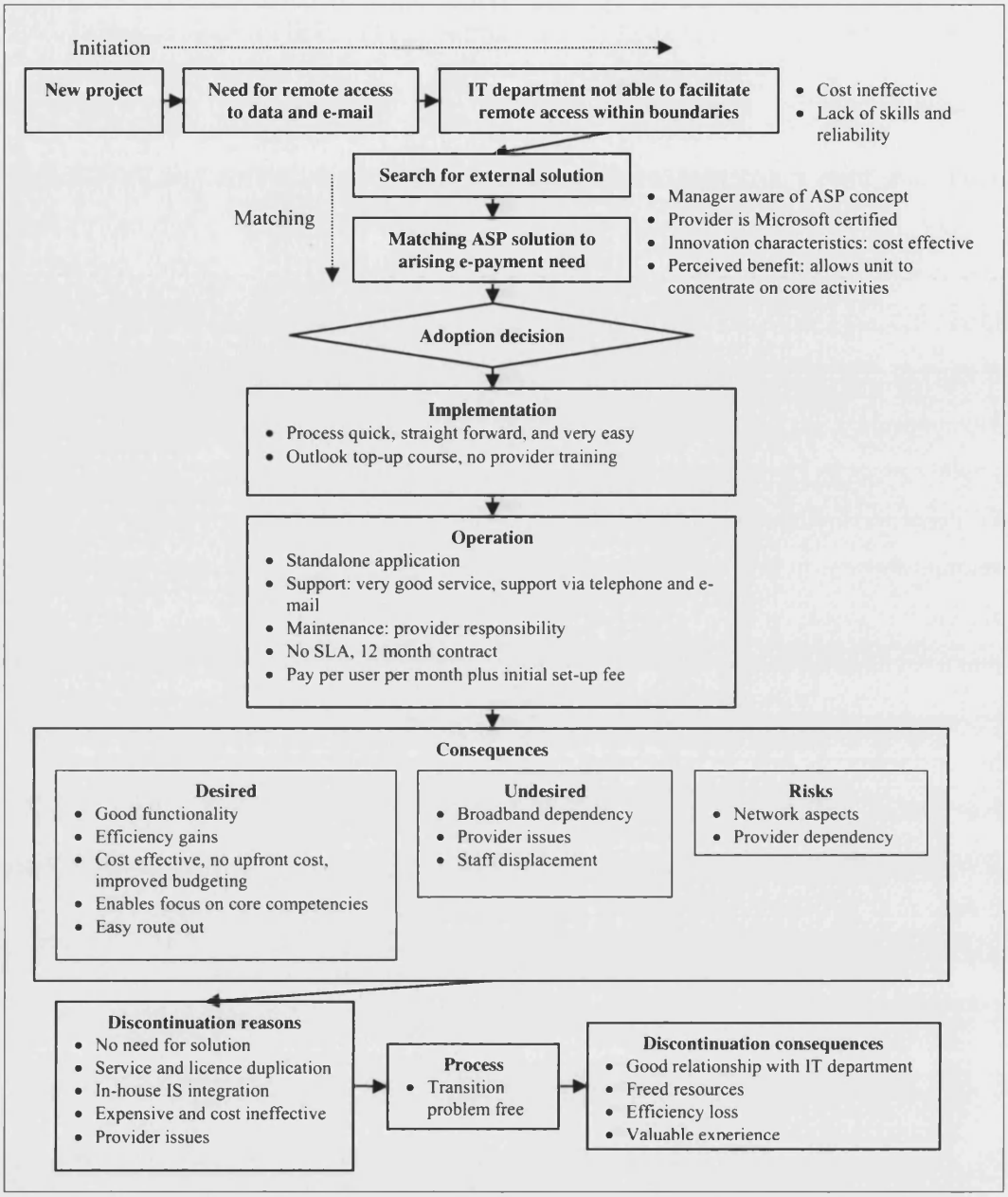


**Figure 28: e-mail diffusion at AT**

The T-unit of the medium-sized firm AT used an e-mail ASP solution from February 2002 until February 2003. Like FDL, only one unit/division of the firm used the solution; it was not implemented company-wide. Adoption of e-mail ASP was driven by the former unit manager who had a new project coming on-stream. This project created the need for remote access to e-mail and data. The manager initially approached the in-house IT department to facilitate this remote access. Yet, the IT department was not able to facilitate remote access at reasonable cost and lacked skills and reliability to perform the task. The difference to the other medium-sized firms is that the T-unit of AT initially approached the IT department to solve the arising IS need, but the IT

department was not able to satisfy the need within the boundaries given. The manager of the T-unit hence engaged in a search to satisfy the arising IS need by other means. He had become aware of the ASP concept and the provider through an initiative that he participated in. The manager chose the provider because it was Microsoft certified. He chose ASP e-mail because it was cost effective and would allow the unit to concentrate on core activities. Unlike the theatres that were restricted by the existing box office provider, and FDL where the customer chose the ASP solution, the manager of the T-unit could pick and choose a solution.

Implementation of e-mail ASP was quick, straight, forward and very easy. AT is the only medium-sized firm that did not experience teething problems. AT carried out in-house training on the e-mail application. This training was for T-unit staff, organised by the T-unit. None of the other medium-sized firms did arrange in-house user training although existing FDL users provide informal training for new users. AT did not use provider training.

Whereas e-ticketing is integrated with other applications and websites at the theatres, the ASP applications at FDL and AT are standalone. AT was satisfied with provider support arrangements. Help was available over the telephone and via e-mail. Maintenance of e-mail ASP was the responsibility of the provider. There was no SLA with Netstore but a twelve month standard contract between AT and Netstore. Payment was per user, per month plus an initial set-up fee.

The T-unit experienced desired, undesired and risk consequences from e-mail ASP. Desired consequences included good functionality, which is identified by FDL and TRP, and efficiency gains which BLT, NWT and FDL report. E-mail ASP is cost effective, bears no upfront cost, has improved budgeting, enables focus on core activities and provides an easy route out. None of the other medium-sized firms mentions these effects. Undesired consequences for AT's T-unit from e-mail ASP included broadband dependency, provider issues and staff displacement. FDL is the only medium-sized firm that does not mention provider issues. Risk consequences at AT are network aspects, also reported by FDL, and provider dependency mentioned by TRP and NWT.

Whereas ASP diffusion ends with consequences at the other medium-sized firms, at AT the diffusion process continues into discontinuation. Following the initial twelve months contract, the T-unit terminated the contract with Netstore and discontinued using e-mail ASP. The new manager of the unit decided to terminate the contract because there was no need for the solution anymore and it duplicated services and licences readily available in-house. AT further preferred to have IS provided by the IT department across all units. The manager also considered the solution to be expensive and cost ineffective in the long term and he had issues with the provider. Transition from e-mail ASP to in-house e-mail was a quick and smooth process. As a result of this discontinuation, T-unit at present has a good relationship with the IT department and has freed financial and hardware resources. The core undesired discontinuation consequence is the loss of efficiency as there is no more remote access to e-mail and data. Overall, the T-unit profits from a valuable experience with ASP and would not hesitate using an ASP service again. The discontinuation at AT shows the flexibility of ASP applications: there are very low barriers to adoption and discontinuation – information systems applications can be adopted rapidly and use can be discontinued in a relatively short time.

## 8.6 ASP diffusion in medium-sized firms

This section discusses ASP adoption, implementation, operation, consequences and discontinuation in the five medium-sized firms BLT, NWT, TRP, FDL and AT. These firms have adopted e-ticketing, e-supply and e-mail ASP solutions. Tickets.com provides e-ticketing to BLT, NWT and TRP, FDL sources e-supply from WeSupply and Netstore supplies e-mail to AT. Netstore and WeSupply are specialist ASP providers that offer e-mail functionality and supply chain solutions on an ASP basis to their customers. Tickets.com is a specialist ticketing software vendor dedicated to the entertainment industry. BLT and NWT were the first medium-sized firms to adopt ASP solutions in 1999, followed by FDL in 2001, and AT between February 2002 and February 2003. TRP was the last adopter in 2003. NWT, FDL and AT have IT departments but none of these have anything to do with the ASP solutions. Table 14 presents an overview of ASP diffusion in medium-sized firms.

| Diffusion phase | Diffusion stage | Subject | BLT | NWT | TRP | FDL | AT |
|---|---|---|---|---|---|---|---|
| Adoption | Initiation | Application need | • Provider approach<br>• Perceived benefits | • Window of opportunity<br>• Customer pressures<br>• Perceived benefits | • Perceived benefits<br>• Customer and industry pressures<br>• E-development | • Desire to retain key customer | • New project |
| | Matching | External search | • None | • Lack of in-house skills and resources | • Previous experiences<br>• Lack of in-house skills | • Key customer matched prior to approaching firm | • In-house IT department cannot facilitate within boundaries Lack of in-house skills<br>• In-house cost ineffective |
| | | Discovery | • Provider approached | • Choice restricted | • Choice restricted | • Customer discovered | • Internet<br>• Provider certified |
| | | ASP choice | • Established relationship with provider<br>• Innovation characteristics<br>• Lack of in-house skills | • Choice restricted by existing IS<br>• Innovation characteristics<br>• Bow to contention | • Choice restricted by existing IS<br>• Innovation characteristics<br>• Bow to contention | • - | • Manager aware of option<br>• Innovation characteristics<br>• Perceived benefits |
| Implementation | Process | Shape | • Quick, couple of months<br>• Teething problems | • Teething problems | • Trial<br>• In-house test run<br>• Slow<br>• Teething problems | • Smooth, quick, 3-4 weeks | • Quick, straight forward, easy |
| | Training | Situation | • Learning-by-doing<br>• Coincidental external informal help | • Learning-by-doing | • Formal provider training at premises<br>• Learning-by-doing | • Formal training from provider at customer premises | • Formal in-house training |
| | | From provider | • - | • None | • Available | • Available | • Not available |
| | | In-house | • - | • None | • Available | • Available from other users | • Available |

**Table 14: ASP diffusion in medium-sized firms**

| Diffusion phase | Diffusion stage | Subject | BLT | NWT | TRP | FDL | AT |
|---|---|---|---|---|---|---|---|
| Operation | Integration | Status | • Fully with standalone box office<br>• Linked with website | • Fully with standalone box office<br>• Linked with website | • Fully with standalone box office<br>• Linked with website | • Standalone | • Standalone |
| | Support | Method | • Telephone | • Telephone,<br>• E-mail | • Telephone<br>• E-mail | • Provider for questions and technical<br>• Customer for problems<br>• Provider helpline | • Telephone,<br>• E-mail |
| | | Satisfaction | • Satisfied | • Minimal, slow communication from provider | • Satisfied<br>• In-house support necessary | • Satisfied | • Very good |
| | Maintenance | Responsibility | • Respective ends<br>• Application: provider | • Respective ends<br>• Application: provider<br>• Maintenance charge p.a. | • Respective ends<br>• Application: provider | • Provider and customer | • Provider responsibility |
| | Contract | Form | • - | • - | • - | • Contract with provider/ customer<br>• No SLA | • 12 months contract<br>• No SLA |
| | Payment | Method | • Customers pay per use | • Licence fee p.a. | • Customers pay per use | • Flat fee p.a. | • Initial set-up fee<br>• Per user per month |

**Table 14 (cont.): ASP diffusion in medium-sized firms**

| Diffusion phase | Diffusion stage | Subject | BLT | NWT | TRP | FDL | AT |
|---|---|---|---|---|---|---|---|
| Consequences | Desired | | • 24/7 box office<br>• Audience development<br>• Marketing effect<br>• Efficiency gains | • 24/7 box office<br>• Audience development<br>• Marketing effect<br>• Efficiency gains<br>• Successful - determined by licence fee | • Good functionality<br>• 24/7 box office<br>• Successfully adopted by customers<br>• Audience development<br>• E-effect | • Good functionality<br>• Efficiency gains<br>• Improved demand planning<br>• Strategic partnership | • Good functionality<br>• Efficiency gains<br>• Cost effective<br>• Focus on core competencies<br>• Easy route out |
| | Undesired | | • System limitations<br>• Provider issues<br>• No increase in sales | • System limitations<br>• Provider issues<br>• Customer alienation<br>• Burden for finance department | • System limitations<br>• Provider issues | • System limitations (including data duplication) | • Broadband dependency<br>• Provider issues<br>• Staff displacement |
| | Neutral | | • Replacement understanding<br>• Individual role changes<br>• No cut-down on manpower | • Replacement understanding<br>• Individual role changes<br>• Business process changes | • Business process changes | • - | • - |
| | Risk | | • Customer alienation | • Provider dependency<br>• Fraud exposure | • System aspects<br>• Fraud exposure<br>• Provider dependency<br>• Customer dependency | • Network aspects<br>• System aspects<br>• Legal aspects (liability issues)<br>• No standard industry application | • Network aspects<br>• Provider dependency |
| Discontinuation | Instigation | | • | • | • | • | • No longer needed<br>• Duplication of services/ licences<br>• IS integration push<br>• Expensive, cost ineffective<br>• Provider issues |
| | Process | | • | • | • | • | • Problem free |
| | Consequence | Desired | • | • | • | • | • Improved relationship with IT department<br>• Resources freed<br>• Valuable experience |
| | | Undesired | • | • | • | • | • Loss of efficiency |

**Table 14 (cont.): ASP diffusion in medium-sized firms**

### 8.6.1 ASP adoption in medium-sized firms

Five of the twelve case firms are medium-sized: three theatres, one services firm and one specialist trader. These firms were prompted to adopt ASP-based applications for various reasons. The initiation of the adoption phase was quite different in each firm. One firm, BLT was approached by the provider and perceived benefits from the application offered. Perceived benefits, customer/industry pressures, e-development and window of opportunity are the initiating factors in the other two theatres NWT and TRP. While there are some synergies between the theatres, initiation at FDL and AT was different: at FDL the sole reason for adopting the ASP-based application was the desire to retain a major customer. At AT, a new project created the need for an application. Application adoption in medium-sized firms therefore can be instigated by internal as well as external sources. Internal sources include perceived benefits, business development and new projects. External instigations include customer and industry pressures, and other third parties initiating such as sales staff approaching potential clients.

The second stage within the adoption phase is matching where firms match an ASP-based application to an arising application need. Matching at FDL is atypical as it was done by the major customer and took place before FDL was approached by its customer. The choice for FDL was whether to adopt that specific ASP-based solution or lose one major customer. At BLT, the matching activity was limited to choosing the specific solution offered by the provider over other solutions available; or alternatively not to adopt the application at all. NWT, TRP and AT carried out an external search to satisfy the arising application need because of skill constraints, coupled with resource constraints at NWT, previous experiences at TRP and financial reasons and internal constraints at AT where the internal IT department was not able to satisfy this arising need within the boundaries given.

In medium-sized firms, attention to ASP-based applications was drawn by providers, customers and through the internet. Of the four firms that had a choice of different applications, two (NWT and TRP) found out that this choice was severely restricted by existing information systems. Innovation characteristics, skill constraints, perceived benefits, and awareness of option did prompt the firms to adopt the ASP solutions. For BLT a key point was the established relationship with the provider offering the

application. For the other two theatres, the restricted choice meant a bow to contention, by adopting the ASP-based application offered by the vendor of the existing in-house IS.

The adoption phase in the medium-sized firms terminated with the decision to adopt the ASP-based application. Following this decision the firms implemented the solutions.

### 8.6.2 ASP implementation in medium-sized firms

The medium-sized firms perceived the implementation process of the ASP-based applications in different ways. The theatres were plagued by teething problems. TRP perceived the process as slow but did do a trial and a one week test run. BLT in contrast did think the process was quick although it did take several months. On the opposite, FDL and AT, the two medium-sized firms that did adopt standalone solutions rather than integrated e-ticketing solutions, perceived the progress to have been smooth, quick, straight forward and easy. Three of the medium-sized firms engaged in formal user training. At FDL it took place at the customer premises and at TRP and AT it was done on the firms' premises. The ASP provider of FDL and TRP delivered the training. AT organised the training in-house bringing in an independent external consultant. User training at FDL and TRP took place before the applications were implemented. Users at BLT and NWT engaged into learning-by-doing. BLT additionally benefited from informal, coincidental help provided by an external source. Different user training methods emerge in medium-sized firms: training from ASP providers delivered in-house or at other premises; training organised in-house but delivered by external consultants, informal, unplanned training and learning by doing. Of the four firms that are aware of provider training two, TRP and FDL, state that they can make use of it if they wanted; and two, NWT and AT, state that it is not available to them. In-house training is available at TRP, FDL and AT but not at NWT and BLT. User training can take place before or after application set-up.

### 8.6.3 ASP operation in medium-sized firms

ASP applications in medium-sized firms are standalone or integrated with a standalone information system including linkages with the firm websites. Integration in medium-sized firms depends on the type of application adopted: e-supply and e-mail applications

are standalone; the three e-ticketing solutions are integrated with the respective information systems. Telephone and e-mail are the predominant support methods with which ASP providers assist their medium-sized client firms. FDL, where the ASP-client relationship consists of the provider, the client and the supplier to the client, additionally can approach its key customer for support. Satisfaction with provider support arrangements on behalf of the medium-sized client firms is good except at NWT where support is perceived minimal and communication is considered slow. In case of e-ticketing, where solutions are integrated with in-house systems, the provider and clients maintain their respective ends of the systems; application maintenance responsibility rests with the provider. At AT, application maintenance rests fully with the provider. In the three-party ASP relationship existing at FDL, the customer and the provider are responsible for application maintenance. In this relationship there is a contract between FDL, key customer and provider. AT had a twelve months contract with the provider. There are (were) no SLA between FDL/AT and providers. It was not possible to identify contractual agreements between theatres and tickets.com. Some ASP providers charge medium-firm customers for their services on a per use basis; others charge medium-sized firm clients flat fees per annum or set-up fees plus payment per user per month. Notably, one theatre pays a fee per annum whereas the customers of the other two theatres pay per use – although all three theatres have the same ASP application from the same provider. Payment for ASP solutions in small firms therefore comes from external sources paying per use, from clients paying per user or via a flat fee per annum and from two clients for different parts of the (supply-chain) solution.

### 8.6.4 ASP consequences for medium-sized firms

The five medium-sized firms experience desired, undesired, risk and neutral consequences from ASP-based applications. The three theatres report many identical desired consequences specific to e-ticketing including 24/7 box office, audience development, marketing and e-effects. FDL and AT, like the theatres, report operational benefits from efficiency gains and good system functionality from ASP-based applications. For FDL the positive strategic effects of improved demand planning and development of a partnership with the key customer are very important. Similarly for AT, ASP-based e-mail allowed the unit to concentrate on core competencies and gave an easy route out with few financial implications as the solution was cost effective. Robust undesired consequences, mentioned often by medium-sized firms, are system

limitations and provider issues. Less frequently cited undesired consequences are no increase in sales, customer alienation, and burden for certain departments in theatres; and broadband dependency and staff displacement at AT. Neutral consequences do arise from e-ticketing solutions: understanding about replacement and manpower cut-down and business process/individual role changes. The remaining category is risks. Medium-sized firms are exposed to ASP-specific risks such as network and system aspects; provider dependency from third-party involvement; and application type risks such as exposure to fraud and customer issues for e-ticketing respectively legal aspects and no standard industry application for e-supply. Whereas in all other firms, the diffusion process continues with operation and consequences, at one firm, AT, the process moved into the next phase: discontinuation.

### 8.6.5 ASP discontinuation in medium-sized firms

Diffusion does not end with operation and consequences: firms discontinue using innovations. The medium-sized firm AT discontinued the use of e-mail ASP after one year. Following a change in division management, the new manager decided to stop using e-mail ASP because the need for the solution did not exist any more. An informal evaluation of e-mail ASP further uncovered that ASP e-mail duplicated services and licences which were readily available in-house. There was also pressure from the technical side of AT who wanted to have IS provided by the IT department across all units. In the long term, the manager, who had issues with the provider, considered the solution to be expensive and cost ineffective. As a result, the manager decided to stop using e-mail ASP. Transition from e-mail ASP to in-house e-mail was a quick and smooth process. Following the discontinuation, the T-unit of AT has a good relationship with the IT department and has freed financial and hardware resources. The core undesired discontinuation consequence is the loss of efficiency as there is no more remote access to e-mail and data. With the discontinuation of e-mail ASP, AT addressed the undesired consequences of provider issues and staff displacement: provider issues is one factor that prompted the discontinuation; and one desired effect of the discontinuation is the improved relationship with the IT department. The desired efficiency gain consequence however is lost with the discontinuation. The discontinuation process was problem-free and shows the flexibility that ASP application can bear: barriers to discontinuation can be low.

## 8.7 Chapter summary

This chapter analyses and discusses ASP diffusion in medium-sized firms. Five diffusion phases emerge: adoption, implementation, operation, consequences and discontinuation. Application adoption in medium-sized firms can be instigated from within as well as from outside the firms. During the matching stage some of the firms discovered that their application choices were restricted due to existing in-house IS and providers and also customer pressures. Only one of the medium-sized firms had a freedom of choice. Successful implementation of ASP-based applications depends on the provider and integration of the solution with other in-house IS. Where integration is necessary, teething problems are a problem. Standalone solutions in contrast are easy to set-up and firms had no problems. User training on new ASP applications in medium-sized firms can be arranged by ASP providers delivered in-house or at external premises. Other forms include training delivered by external consultants, informal/unplanned training and learning by doing. In medium-sized firms ASP application integration depends on the type of application. Provider support is mainly over telephone and e-mail with most firms being content with support arrangements. Application maintenance is integration sensitive and application distinctive. Contractual agreements between the parties involved are standard. Medium-sized firms pay for ASP-applications by way of annual fees, payment per user and from customers that pay per use. Consequences from ASP can be operational as well as strategic. Consequences can also be ASP-specific, application-particular, and combinations thereof. The e-supply ASP diffusion is in many ways different to other ASP-based applications. One medium-sized firm is the first to have continued the diffusion process into the discontinuation phase.

This chapter concludes the reasoning about ASP diffusion in SMEs. Chapter nine discusses the higher level findings emerging from the analysis and discussion presented in Chapters six, seven and eight.

# 9 CHAPTER NINE: ASP DIFFUSION IN SMES

This chapter interprets the findings presented in chapters six, seven and eight in the light of existing literature and the research objective. The mechanism used to address the emerging larger issues is to first discuss the research questions which focus on the various diffusion stages:

- Why do SMEs adopt ASP?
- How do SMEs implement ASP?
- How do SMEs operate ASP?
- What consequences do SMEs face from adopting and implementing ASP?

These stages are clearly visible in micro, small and medium-sized firms; but whereas the previous chapters analyse ASP diffusion in individual firms and discuss findings relating to the various firm sizes, this chapter presents the cross case analysis and discusses findings at a higher level of abstraction. The chapter concludes with addressing the main research question

- How does an IS innovation, ASP, come to be adopted by, and diffused within, SMEs?

This question provides the empirical foundation for the model of the information systems innovation life-cycle in SMEs. This model is discussed in light of the existing literature and the conceptual framework presented in Chapter three.

## 9.1 Why do SMEs adopt ASP?

Rogers (2003) proposes that organisations adopt innovations following an initiation phase which consists of an agenda-setting and a matching stage. These two stages, leading up to innovation adoption, are evident in the SMEs. However, the stages are not necessarily sequential; and they comprise sub-stages. Table 15 summarises the ASP adoption phase in SMEs.

| Phase | Stage | Micro firms | Small firms | Medium firms |
|---|---|---|---|---|
| Adoption | Initiation | Internal:<br>• Innovation awareness, benefits perceived & trial opportunity (1)<br>• Business development (1) | Internal:<br>• Owner-manager characteristics (1)<br>• Perceived benefits (1) | Internal:<br>• Perceived benefits (3)<br>• Business development (1) |
| | | External:<br>• Government funding available (1) | External:<br>• Customer pressures (1)<br>• Third party recommendations (1) | External:<br>• Customer pressures (3)<br>• Industry pressures (1)<br>• Third parties (1) |
| | | Specific:<br>• New business formation (2) | Specific:<br>• Emerging opportunity (1) | Specific:<br>• Emerging opportunity (1)<br>• New projects (1) |
| | Matching | External search due to:<br>• Internal constraints: skills (1), entrepreneur (1)<br>• Perceived benefits (2) | External search due to:<br>• Internal constraints: skills (2)<br>• Previous experiences (1) | External search due to:<br>• Internal constraints: skills (3), resources (3), financial (1)<br>• Previous experiences (1) |
| | | Discovery:<br>• Awareness (1)<br>• Internet (2)<br>• Third parties (1) | Discovery:<br>• Third parties (2) | Discovery:<br>• Providers (3)<br>• Internet (1)<br>• Third parties (1) |
| | | ASP choice:<br>• Innovation characteristics (4)<br>• Perceived benefits (2)<br>• Constraints: skills, resources (1)<br>• Provider characteristics (2)<br>• Third-party recommendation (1) | ASP choice:<br>• Innovation characteristics (1)<br>• Constraints: restrictions (1)<br>• Third party recommendations (2) | ASP choice:<br>• Innovation characteristics (4)<br>• Perceived benefits (1)<br>• Constraints: skills (1), financial (2), restrictions (3)<br>• Owner-manager characteristics (1)<br>• Established relationship with provider (1) |
| | | Matching carried out by third party (1) due to<br>• Project nature | Matching carried out by third party (2) due to<br>• Constraints: skills (1)<br>• Previous experiences (1)<br>• Nature of project (1) | Matching carried out by third party due to<br>• Constraints: pressures (1) |

**Table 15: ASP adoption in SMEs**

The ASP adoption phase in SMEs comprises an initiation stage and a matching stage which instigate the adoption of the innovation. The following sections discuss these stages in detail.

### 9.1.1 The initiation stage

Innovation adoption in organisations is understood to be initiated during the agenda-setting stage where a general organisational problem creates a perceived need for an innovation (Rogers, 2003). In SMEs, innovation adoption is not solely driven by organisational problems that create an innovation need: ASP adoption in SMEs shows that initiation can be instigated from within the firm, from outside the firm and through other issues that include firm-size-specific and situation-specific initiators.

Internal factors instigating ASP adoption in SMEs are perceived benefits, business development, owner-manager characteristics, and innovation awareness coupled with trial opportunity. Benefits perceived by owner-mangers and entrepreneurs is the key internal initiation factor driving ASP adoption in SMEs. The other internal factors, except business development which is reported by one micro and one medium-sized firm, are mentioned by single firms. The manager of one micro firm did become aware of the ASP-based application which instigated a need. This internal initiation is different in that innovation awareness created the need. In the other cases application needs did arise unrelated to innovation awareness.

External instigations include customer pressures, government funding available, industry pressures and third party initiations. In four of the small and medium-sized firms customer pressures played a role in the adoption of the application. Two third parties instigated application adoption in two small and medium-sized firms respectively. One of these third parties recommended the application to its customer; the sales force of the other third party did convince the SME client of the benefits of the application on sale. One micro firm was prompted by an external factor, government funding to adopt an application.

Besides these two initiation categories, the third group is specific factors. This category includes firm-size-specific factors where, for example, application adoption was initiated by new business formation in two micro firms and a new project initiated

adoption in one medium firm. Another example of a specific factor is situation-specific such as emerging opportunities in small and medium-sized firms.

While these generic categories emerge, IS innovation adoption initiation in SMEs should not be looked at as comprising of factors in isolation: initiation often originates from an amalgamation of factors from different categories.

### 9.1.2 Matching

The second stage of the adoption phase is matching where a problem from the organisation's agenda is matched with an innovation (Rogers, 2003). ASP matching, as evident in the SMEs, is intertwined with the initiation stage and consists of an external search, solution discovery and the decision to adopt an ASP-based application. Matching can take place prior to initiation which the e-supply case study shows, but this is not the norm: in most cases, entrepreneurs or SME owner-managers did engage in a search to satisfy an arising application need; or third party firms carried out a search and presented an ASP-based application to the SMEs. Those SMEs that did engage in external searches did so because of internal constraints, previous experiences and benefits perceived from external solutions. Internal constraints were entrepreneurial, financial and lack of skills and resources. Lack of skills is the most frequent motivator for an external search. For two of the micro firms perceived benefits were a factor and two firms, one small one medium-sized, were driven by previous experiences. Those SMEs that were not aware of the ASP model and/or of ASP providers/solutions discovered their adopted applications through third-parties, providers and on the internet.

SMEs did choose to adopt ASP-based applications because of characteristics associated with the ASP-based applications; benefits perceived; constraints such as restrictions, skills, resources, and finances; third party recommendations; provider characteristics; owner-manager characteristics; and established relationships with providers. The reasoning for ASP was most frequently based on characteristics and constraints followed by perceived benefits, third party recommendations and provider characteristics. In cases where third-parties were responsible for matching ASP, SMEs did so because of project natures, constraints from skills and pressures, and previous experiences.

One factor that continuously appears in the different matching activities is constraints in a variety of forms such as lack of skills and restrictions imposed. This factor seems to be a powerful motivator leading to ASP adoption. Following the initiation which creates the need for an application, SMEs satisfy it by matching an ASP-based application to the arising need. Whereas this study specifically investigates the adoption of ASP-based applications in SMEs, organisations may use other means to satisfy an arising application need. The following section reviews the findings from the adoption phase in light of the existing literature.

### 9.1.3 ASP adoption findings in light of the existing literature

SME decisions to adopt ASP applications are based on two distinctive issues: instigation, where the need for an application arises; and realisation, where a decision is reached to adopt an ASP-based application to satisfy a need. A key finding from this research is that initiation comes from sources within firms, outside firms, and situation/firm-size specific issues. These are the three core categories creating IS needs in SMEs. Although Rogers (2003) identifies two distinctive stages of innovation adoption in organisations, agenda-setting and matching, instigation and realisation are different to agenda-setting and matching: these two stages are not sequential; instigation originates from internal, external and specific sources as opposed to solely organisational problems; and SMEs can engage in a matching activity where an innovation is fitted to an arising need, but realisation can solely comprise of a decision as an organisation may have no other choice but adopting an IS application. Another example is matching done by third parties.

Instigation and realisation are different from Cooper and Zmud's (1990) initiation and adoption stages: during instigation the need for an IS/IT/application arises and during realisation a decision is reached to adopt a specific IS/IT/application. At Cooper and Zmud's initiation stage (Figure 4) pressure to change evolve from either organisational need (pull), technological innovation (push) or both. Whereas pull and push forces are evident in the SMEs, internal, external and specific factors present a more accurate picture of the instigation situation in SMEs. Instigation does not include an SME matching activity although third party firm instigations can include matching activities carried out by third party firms and not by SMEs. SMEs match solutions to arising

needs in the realisation stage where like in Cooper and Zmud's model a decision is reached to adopt an IS/IT/application or innovation.

While the diffusion literature provides two stages for the adoption process, propositions regarding ASP adoption in SME have, to date, not considered the dual-nature of the ASP model: neither theoretical contributions nor empirical studies (Heart & Pliskin, 2002, Johansson, 2003, 2004, Lockett, et al., 2006) expose this dual nature. The findings from this research however provide strong evidence that ASP adoption in SMEs needs to be understood as comprising the need for an application (instigation) and the realisation via the ASP-model. Comparing the factors within instigation and realisation to the literature synthesis in Chapter three, some interesting findings emerge: instigation factors relate to the literature on IS adoption in SMEs (Section 3.2.1) whereas realisation factors relate to ASP propositions for SMEs (Section 3.3.1) and innovation adoption in SMEs (Section 3.1.1). The three instigation categories of internal, external and specific factors can be compared with, for example, perceived benefits, organisational readiness and external pressures (Iacovou & Benbasat, 1995); and organisational, environmental, and perceived benefits (Kuan & Chau, 2001) driving IS adoption in SMEs. In this study, perceived benefits are key internal factors and pressures are key external factors besides third-party initiation. Realisation factors correspond to categories synthesised in Table 1 and Table 2. In the ASP propositions context, perceived benefits, resource shortages, financial incentives and technical issues are proposed to drive ASP adoption in SMEs. Yet, whereas these propositions do not emphasise the significance of specific factors, it is possible to do so from this research and evaluate it in the light of other empirical foundations. The SMEs cited most frequently that they adopted ASP-based applications due to the characteristics of ASP and internal constraints such as lack of skills. Perceived benefits, third party recommendations and provider characteristics are other, less frequently cited factors. The findings therefore support Johansson's (2003) notion that cost is not a core determinant for ASP adoption in SMEs and contests Lockett et al. (2006) who find that for their sample of SMEs, cost was the most significant driver for ASP adoption. The resource shortages cluster of Table 2 (Cherry Tree & Co., 1999, Currie, 2003, Dewire, 2000, iT2, 2002, Kern, et al., 2002b, Weerakkody, et al., 2003, Weiss, 2001) therefore is most relevant. The second most important factor emerging for ASP adoption is characteristics associated with ASP. The study confirms that innovation characteristics is an influential innovation adoption driver for SMEs (Panizzolo, 1998, Thong, 1999).

This research further uncovers that instigation and realisation are intertwined as adoption seldom is driven by one single factor but rather by a combination of different factors. This understanding about adoption can explain discrepancies in the existing adoption literature: while Mehrtens et al. (2001) find that external pressure influences internet adoption in SMEs, Levy and Powell (2003) find no evidence for this cluster. Similarly, Thong (1999) finds that environmental characteristics do not influence IS innovation adoption in SMEs but Panizzolo (1998) does find evidence supporting this cluster. The external cluster seems to have a particular tendency to either appear or not appear. Most importantly however the understandings emerging from this study explain that adoption in SMEs is usually founded on unique combinations of different factors. As these factors are mostly intangible, it is difficult to measure them. The qualitative case study design aided the development of this understanding.

## 9.2 How do SMEs implement ASP?

The innovation implementation phase proposed by Rogers (2003) consists of the three stages redefining/restructuring, clarifying and routinizing. At the redefining stage an innovation is modified and re-invented to fit the organisation. Organisational structures are altered at this stage. At the clarifying stage the relationship between the organisation and the innovation is defined more clearly. At the routinizing stage, the innovation becomes an ongoing element in the organisation's activities and looses its identity. The implementation process in SMEs refers to the process of putting the IS innovation into use and investigates training for SME members on the new application. Rather than mirroring Rogers' three stages, ASP implementation in SMEs relates to Cooper and Zmud's third stage, adaptation where the ASP application is installed. The core difference to Cooper and Zmud's model is that ASP applications are not developed and maintained (see section 9.3 for maintenance) by the SMEs. The outcome of the implementation phase is that applications are available for use in the SME and users can begin use it. Table 16 summarises ASP implementation in SMEs.

| Phase | Stage | Micro firms | Small firms | Medium firms |
|---|---|---|---|---|
| Implementation | Process | • Perceived positive (4) | • Perceived positive (3)<br>• Teething problems (1 theatre)<br>• Partner firm responsibility (2) | • Teething problems (3 theatres)<br>• Perceived positive (2 standalone solutions)<br>• Perceived normal (1)<br>• Perceived negative (2) |
| | Training | • Computer literacy (4)<br>• Formal in-house by entrepreneur (1)<br>• Learning-by-doing (1)<br>• Guides (Internet and others) (2) | • None (2)<br>• Learning-by-doing (1) | • Formal from provider at firm premises (1)<br>• Formal from provider at external premises (1)<br>• Formal in-house by third-party (1)<br>• Informal help (1)<br>• Learning-by-doing (3) |

**Table 16: ASP implementation in SMEs**

The two elements of the implementation phase are process and user training. During the implementation process, SMEs put ASP-based applications into use. The majority of SMEs perceived the implementation process positively. Only one medium-sized firm had a negative experience. The four theatres, all of whom have applications from the same provider, experienced teething problems when the solutions were implemented. The firm that had a negative experience is also a theatre. The fact that the majority of SMEs perceived the implementation process as positive or satisfactory (except the clients of one particular provider which suffered from a lot of teething problems) suggests that implementation success of ASP-based applications is dependent to a great extent upon the provider. Another implementation process influence is whether an application needs to be integrated with an existing in-house IS which is where many teething problems at the theatres originated from. An implementation issue specific to small firms is that SME partner firms may be involved in ASP application implementation. ASP therefore does indeed foster faster software implementation (Cherry Tree & Co., 1999, Currie, 2003, Kern, et al., 2002b, Weerakkody, et al., 2003, Weiss, 2001) with the important benefit of reduced complexities involved in installing software (Dewire, 2000). Transfer of existing data to ASP solutions (Currie, 2003) can be interpreted in the light of teething problems that originate from the needed integration to facilitate data transfer. As external, third-party firms have been involved with successful ASP implementation, external expertise can determine IS implementation success (Thong, et al., 1996, 1997), particularly when ASP vendors are considered as external firms. There is no evidence for top management support being a key variable (Caldeira & Ward, 2002, Fink, 1998, Grandon & Mykytyn, 2004, Heikkila, et al., 1991, Premkumar, 2003, Riemenschneider, et al., 2003, Thong, et al., 1997) for the successful implementation of ASP in SMEs.

User training refers to preparing new users for using the application. While some SMEs have not done any user training, some of the firms have prepared their users for application usage through formal training sessions, and others have provided informal help or were learning-by-doing. Formal user training is hardly ever done by micro and small firms. Only one micro firm did arrange a formal in-house training session which was provided by one of the firm's owners. Formal training sessions are more common in medium-sized firms where four of the five firms did engage in formal training. These formal sessions were held at SME premises or external premises and were organised and delivered by providers, SME personnel or external consultants. Training on new information systems for users and employees and the quality of this training is a critical implementation success factor for IS (Caldeira & Ward, 2002, Fink, 1998, Grandon & Mykytyn, 2004, Heikkila, et al., 1991, Premkumar, 2003, Riemenschneider, et al., 2003) and IS innovations (Panizzolo, 1998). As it emerges in this study, training on ASP applications is important in medium-sized firms but by no means a critical success factor in SMEs. Learning-by-doing is widely spread with formal user training complementing this informal approach.

ASP contributions do not differentiate between implementation and operation of ASP-based solutions in SMEs. The findings suggest a clear cut between the set-up of the application and the resulting day-to-day operation/management of the solution. The following section discusses ASP operation in SMEs.

## 9.3 How do SMEs operate ASP?

This study categorises five ASP operation issues: integration of the ASP application with other in-house IS, vendor support for the SME, maintenance of the ASP application, contracts between vendor and SME and pay arrangements for ASP-based applications. Initial attention to these issues originates from the literature review, but during fieldwork it became apparent that these are operational rather than implementation issues. The following sub-sections discuss these five issues. In terms of Rogers' (2003) model, operation is situated somewhere in the clarifying and routinizing stage, yet, it is an ongoing stage that does not terminate unless the SME terminates the use of the ASP application. Table 17 provides an overview of ASP operation in SMEs.

| Phase | Stage | Micro firms | Small firms | Medium firms |
|---|---|---|---|---|
| Operation | Integration | • Integrated with respective IS (3)<br>• Standalone (1) | • Integrated with respective IS (3) | • Integrated with respective IS (3)<br>• Standalone (2) |
| | Support | Method:<br>• E-mail<br>• Telephone<br>• Internet (1) | Method:<br>• E-mail (1)<br>• Telephone (2)<br>• ICQ (1)<br>• Dial-in, annual meetings and newsletters (1)<br>• Informal (1) | Method:<br>• E-mail (4)<br>• Telephone (5)<br>• From both provider & customer (1) |
| | | Satisfaction:<br>• Content (3)<br>• Not content (1) | Satisfaction:<br>• Content (1)<br>• Not content (1)<br>• Split (1) | Satisfaction:<br>• Content (4)<br>• Not content (1) |
| | Maintenance | • Provider responsibility (4) | • Provider responsibility (1)<br>• Respective ends (2) | • Provider responsibility (1)<br>• Respective ends (3)<br>• Provider and customer (1) |
| | Contract | • No SLA (4)<br>• Standard (2) | • No SLA<br>• Quote and invoice (1) | • No SLA (1)<br>• 12 months contract (1)<br>• With provider and customer (1) |
| | Payment | • Fee p.a. plus per use (2)<br>• Per user per month (1)<br>• Per use (1) | • Fee p.a. (2)<br>• Customers pay per use (1) | • Fee p.a. (2)<br>• Customers pay per use (2)<br>• Set-up fee plus per user per month (1) |

**Table 17: ASP operation in SMEs**

The adoption and implementation of an IS influences the SME's existing technology environment as new systems have to be set-up, and operated and existing IS may have to be modified and procedures changed (Panizzolo, 1998). When SMEs adopt IS innovations, these are often standalone systems with low levels of integration (Currie, 2003). In the case firms, ASP integration is purposeful: applications are integrated with respective systems when necessary, otherwise standalone. The majority of applications in the SMEs are integrated. The level of integration depends on the amount of data transfer necessary between application and other systems. In theatres, for example, data transfer is necessary twenty-four hours a day which is why these systems need high level integration with the respective systems. SMEs do not consider the integration of ASP across multiple customer platforms, sites and environments and possible resulting business process re-design as proposed by Smith & Kumar (2004).

The second ASP operation issue is vendor support. While scholars propose that support for users fosters successful ASP implementation (iT2, 2002), the relationship element of the ASP concept calls for continuing vendor support. ASP providers support SME customers mainly over the telephone and e-mail. Others, less frequently, used forms of support including informal assistance, dial-in, ICQ (an oronym for the phrase 'I seek you'), information on websites, annual meetings and newsletters. In the e-supply case, support is available from both, the vendor and the customer. SMEs tend not to approach

ASP vendors for support unless they experience problems with the ASP application. Prior to approaching the vendor, many SMEs tend to investigate whether the problem originates in-house. Some of the vendors actively pressure SMEs to investigate in-house prior to taking action. Many SMEs are content with support from their provider but three SMEs are not content at all and one is partly content and partly disappointed. Satisfaction is critically influenced by the relationship between the vendor and the SME. One grey area emerging is who is responsible for support of third-party users such as customers booking tickets online: is it the vendor or is it the SME? Whereas e-ticketing bookers have no support when booking online there have never been problems with customers using e-payments.

The third operation issue is maintenance of the ASP solution. The literature synthesis reveals that one significant benefit of ASP is that SMEs do not have to look after application maintenance: the ASP provider is responsible for controlling, maintenance and management of the solution (Cherry Tree & Co., 1999, Currie & Seltsikas, 2000). The empirical evidence supports the proposition that ASP providers are responsible for application maintenance. Yet, in cases where ASP applications are integrated with in-house IS, maintenance is respectively, with the provider looking after their end of the chain (including the application) and the SME tending to the in-house elements. In specific cases such as e-supply, a third-party can bear some of the maintenance responsibility. In general, SMEs spend little or no time on ASP solution maintenance. The micro firms in particular benefit from not having to worry about application maintenance.

Contractual agreements between ASP providers and SME customers is another operation issue investigated in this study. Unlike in traditional IS outsourcing, ASP contracts are flexible service level agreements (SLAs) valid over a period of time (2002), usually between twelve and twenty-four months. Strikingly, the majority of SMEs are not aware of SLAs and some do not even know what an SLA is. SMEs have standard contracts with ASP providers. These contracts are usually short term, renewable after twelve months. In the theatres, managers are little aware of contracts and information about contractual agreements could not be obtained from interviewees.

Previous studies conclude that clients compensate ASP providers for their services with a monthly rental payment that is calculated on a per use or per user basis (Currie, 2003,

Susarla, et al., 2003). This study finds that these proposed options are not the only methods used: some SMEs do pay on per user or per use basis but others do pay flat fees or a combination of a flat fee plus a payment per user/per use. Some SMEs do not pay at all for the ASP service, but third parties do: the customers of three of the theatres pay a booking fee and the customer using e-supply bears the majority of the cost. Some ASP providers charge their customers an initial set-up fee and the theatre that pays an annual licence is charged an annual maintenance fee on top of the licence fee. In conclusion, different ASP pricing models exist. SMEs can pay flat fees per annum; pay per user or per use; or a combination of both. Third-parties, such as SME customers, can pay ASP providers and both, SMEs and third parties can pay ASP providers. Payment methods are not restricted to pay per user or per user.

The existing literature does not supply a lot of information about these five operation issues. Hence, discussion in light of existing literature is limited. While operation of ASP solutions is one of the phases following ASP implementation, the other is consequences. The following section discusses ASP consequences for SMEs.

## 9.4 What consequences do SMEs face from ASP?

In the innovation diffusion field, consequences of innovations are functional and dysfunctional effects for the adopting unit. In the case of ASP, scholars propose many benefits for SMEs, a significantly lower number of undesired effects, and other consequences such as business process changes. The following sections discuss desired, undesired, neutral, and risk consequences of ASP for SMEs as summarised in Table 18.

| Phase | Stage | Micro firms | Small firms | Medium firms |
|---|---|---|---|---|
| Consequences | Desired | Category:<br>• Operational: good functionality (4), efficiency gains (3)<br>• Strategic: positive customer impact (4), supports business development (3), enables focus on core competencies (2)<br>• Financial: cost effective (2) | Category:<br>• Operational: good functionality (2), efficiency gains (1), system related (1)<br>• Strategic: positive marketing effect (1),<br>o e-commerce specific (1 firm): 24/7 box office, audience development, positive marketing effect, competitive advantage, e-development<br>• Financial: cost effective (1) | Category:<br>• Operational: good functionality (3), efficiency gains (4)<br>• Strategic: enables focus on core competencies (1), strategic partnership (1), improved planning (1)<br>o e-commerce specific: 24/7 box office (3), audience development (3), positive marketing effect (2), positive customer impact (2), e-effect (1)<br>• Financial: cost effective (1)<br>• ASP -specific: easy route out (1) |
| | Undesired | Category:<br>• Financial: cost ineffective (3), burden (2), cost increase (1)<br>• ASP business model specific: provider issues (2), broadband dependency (1)<br>• System limitations (1) | Category:<br>• Financial: no increase in sales (1)<br>• ASP business model specific: provider issues (1)<br>• System limitations (2) | Category:<br>• Financial: no increase in sales (1)<br>• ASP business model specific: provider issues (4), broadband dependency (1)<br>• System limitations (4)<br>• Business implications: burden for specific departments (1), staff displacement (1) |
| | Neutral | • Understanding: about ASP viability (1) | • Changes: individual roles (1), business processes (2)<br>• Understanding: about solution capacity (1), about ASP viability (1) | • Changes: individual roles (2), business processes (2)<br>• Understanding: about solution capacity (3) |
| | Risk | • ASP business model related: network (2), provider (2)<br>• Application related: exposure to fraud (2) | • ASP business model related: network (3), provider (1)<br>• Application related: exposure to fraud (1), customer alienation (1)<br>• System aspects (2) | • ASP business model related: network (2), provider (3)<br>• Application related: exposure to fraud (2), customer alienation (1), customer dependency (1)<br>• System aspects (2)<br>• Business: legal aspects (1), lack of standard industry application (1) |

**Table 18: ASP consequences for SMEs**

### 9.4.1 Desired consequences

Beynon-Davies (Currie, 2003, Weiss, 2001) advocates that organisations invest in IS with the aim to increase efficiency and effectiveness. SMEs using ASP do report operational benefits such as efficiency and effectiveness gains, but other important desired effects emerge. Desired consequences from ASP-based applications for SMEs are classified as operational, strategic, financial and ASP-specific. The majority of effects are operational and strategic. Operational benefits include efficiency gains, good functionality, and other system related positive effects. Many of the SMEs report efficiency gains and good functionality. The majority of efficiency gains in SMEs originate from time and resource savings, therefore confirming IS in SMEs findings (Kern, et al., 2002a, Weerakkody, et al., 2003). Other system related positive effects emerge in one small firm and this effect is related to good functionality. Hence, core desired consequences for SME from ASP-based applications of an operational nature are good functionality and efficiency gains.

Strategic desired consequences are often application-specific, as SMEs using the same applications report the same effects. Examples include e-ticketing that results in positive customer impacts, marketing effects, and audience development among others for theatres. Other synergies exist between solutions that fall into certain categories such as e-commerce applications. E-ticketing and e-payments are e-commerce applications that have similar effects on SMEs such as positive customer impact, which is emerging as the significant positive effect from e-commerce applications. For micro firms, the important strategic effects are that ASP applications support business development and enables focus on core competencies. Whereas significant strategic implications of e-commerce applications originate from the applications rather than from the ASP mode of delivery, in micro firms the major strategic consequences arise from the ASP-mode of delivery. In one medium-sized firm the strategic consequence relating to the ASP-mode of delivery is that it enables a focus on core competencies. The adopter of the e-supply chain solution benefits tremendously from the strategic partnership and forward planning consequence. None of the other firms reports this effect, yet, none of the other firms has adopted an ASP supply chain solution. This major effect, unanticipated by the firm, is the result of the combination ASP/application.

Other emerging desired consequences of ASP-based solutions are financial and ASP specific. Four firms report financial implications in terms of cost effectiveness of solutions. This financial effect originates from the ASP model as is the fact that ASP offers flexibility through an 'easy route out'.

In conclusion, SMEs experience operational, strategic, financial and ASP-specific desired consequences. These consequences originate from the ASP model, the application adopted, and combinations thereof. Whereas operational consequences cannot clearly be associated with either ASP-model or application but need to be understood as a combination thereof, the majority of strategic benefits are derived from either application or ASP-mode of delivery. Applications of comparable purpose have similar strategic consequences for SMEs. Another important implication is that for micro firms more strategic consequences arise from ASP-based applications than for whereas for small and medium firms. All this evidence supports the propositions that ASP enables SMEs to focus on core competencies (Cherry Tree & Co., 1999, Currie, 2003, Liddle, 2001, Weerakkody, et al., 2003, Weiss, 2001); to realise efficiency gains (Currie, 2003); and that it improves customer service (Heikkila, et al., 1991, Naylor & Williams, 1994). Although widely acclaimed, financial implications from ASP (Currie, 2003, Weiss, 2001) are not very significant but they do exist. While Johansson (2003) finds that SMEs tend to view ASP as something operational rather than strategic, this study does find evidence for both, operational and strategic consequences. From the design of the study it is not possible to conclude what are more important, operational or strategic effects.

### 9.4.2 Undesired consequences

Undesired consequences are dysfunctional effects of ASP-based applications for SMEs. Undesired consequences in SMEs originate from financial implications, system limitations, the ASP business model and business implications. All of these occur in the different types of SMEs except business implications, which are reported by two medium-sized firms.

Financial implications include cost increases, cost ineffectiveness, financial burdens and no increase in sales. This finding challenges current literature (Cherry Tree & Co., 1999, Currie, 2003, iT2, 2002, Kern, et al., 2002b, Lockett, et al., 2006, Weerakkody, et

al., 2003) (Curtis, 2000, Dewire, 2000) which promotes that ASP is a cost-driven business model. To some extent, it confirms that ASP can bear unanticipated costs for SMEs (Curtis, 2000, Kern, et al., 2002b). Micro firms in particular suffer from undesired financial implications.

ASP-business model specific undesired consequences are provider issues and broadband dependency. Provider issues is a significant undesired consequence as it is reported by many of the SMEs. System limitations is the other significant undesired consequence for SMEs as the majority of SMEs suffer from these two forms of limitations. Susarla et al. (2003) remind ASP providers that their applications have to meet standards of software capability, yet, as most SMEs report system limitations, the majority of ASP applications provided do not seem to meet standards of software capability. Problems with the provider include disputes and dissatisfaction with service quality. Undesired consequences relating to service issues (Kern, et al., 2002b) have been proposed, yet, service quality has not been mentioned. Provider issues anticipated include lack of qualified provider staff (Cherry Tree & Co., 1999), reliability and viability (Hoffman & Kashmeri, 2000), goes bankrupt (Kern, et al., 2002b), and dependency (Currie, 2003, Kern, et al., 2002b, Susarla, et al., 2003). These factors, bar lack of qualified staff, are often categorised as provider related risk consequences by SMEs. The relationship element of the ASP concept forces SMEs to engage and manage an ongoing relationship with the ASP provider (2000). Many provider issues originate from this relationship element.

In conclusion, SMEs experience numerous undesired consequences, many of which have not been proposed to date. These undesired consequences can affect SMEs, SME users, and SME customers. Two effects are particularly burdensome for SMEs: system limitations and provider issues.

### 9.4.3 Neutral consequences

Neutral consequences are changes from, and understandings about, ASP and applications that SMEs consider neither beneficial nor disadvantageous. The four theatres, one micro firm, and one small firm report neutral consequences. The micro and the small firm have come to understand that their ASP-based solutions need replacing in the long-term future: the ASP-application is a temporary solution that will be

substituted by another IS/IS innovation, once a certain cut-off point, defined by the SME, is reached. Besides understanding that e-ticketing cannot replace the physical box office, and that box office staff roles are changing, ASP-based e-ticketing has resulted in minor business process changes at the four theatres. There was no major business process re-design (Smith & Kumar, 2004) following e-ticketing implementation. In the theatres, ASP-based e-ticketing causes some minor role changes for employees of certain departments, but not for IT employees and managers as proposed by Smith and Kumar (2004). In conclusion, neutral consequences represent, to some extent, other consequences from ASP identified in the literature review (Section 3.3.3.3). Understandings and business process/role changes emerge as neutral consequences from ASP for SMEs.

### 9.4.4 Risk consequences

The remaining consequence category is risks that SMEs are exposed to as a result of using ASP-based applications. These risks fall into the following categories: ASP business model related, application related, system aspects and business issues. Risks originating from the ASP business model are network aspects due to the ASP mode of delivery over a network and provider related as the ASP model incorporates a third-party provider element. This evidence supports previous studies that emphasise vendor related (Bryson & Sullivan, 2003, Currie, 2003, Kern, et al., 2002a) risks and the network dependency issue (Currie, 2003). The findings confirm that SMEs believe that dependency on an ASP provider and a network is a core risk that comes with the ASP model.

Application related risks originate from the application adopted and include exposure to fraud, customer alienation and customer dependency for e-commerce applications. The remaining risks are system aspects originating from the specific solution adopted; and business aspects, which are applicable to e-supply and include liability issues and lack of standard industry supply chain solutions. The literature does not provide any information on these kinds of application-specific risks.

## 9.5 Discontinuation of ASP

While two SMEs understand that their ASP-based applications will need replacing in the future, one firm has stopped using ASP. This SME benefited from the flexibility of the ASP contract which allowed it to terminate the agreement with the provider after a period of twelve months. Following a change in unit management, the new manager realised that the ASP service duplicated services and licences that were readily available in-house; and that the solution was expensive and cost ineffective in the long term. Ongoing issues between the provider and the firm, and the SME's desire to have IS provided by the IT department across all units, further influenced the manager's decision. The process of moving the ASP application back in-house was perceived as quick and smooth by the unit. As a result of this discontinuation, the SME's unit has a good relationship with the IT department and has freed financial and hardware resources. The core undesired discontinuation consequence is the loss of efficiency as there is no longer remote access to e-mail and data. The unit reasons that ASP was a valuable experience. Table 19 summarises the discontinuation at the medium-sized firm.

| Phase | Stage | Micro firms | Small firms | Medium firm |
|---|---|---|---|---|
| Discontinuation | Instigation | - | - | • Financial: cost ineffective, expensive<br>• Internal: need ceases to exist, business changes, duplication of existing services/licences<br>• Provider issues |
| | Process | - | - | • Perceived positive |
| | Consequences | - | - | • Desired: improved internal business climate, resources freed, good experience<br>• Undesired: operational: loss of efficiency |

**Table 19: ASP discontinuation in medium-sized firms**

There is no contribution regarding discontinuation of ASP available from the SME and ASP literature. In innovation diffusion (Rogers, 2003), discontinuation of innovations in organisations remains to be studied in depth. Rogers recaps that individuals may reject an innovation after it has previously been adopted because of dissatisfaction with the innovation (disenchantment discontinuance), or because it is replaced with an improved idea (replacement discontinuance). Whether findings regarding individual discontinuation are applicable to organisations remains to be studied.

## 9.6 The IS innovation life-cycle in SMEs

Previous sections discuss the different phases of ASP diffusion in SMEs. This section addresses the main research question: 'How does an IS innovation, ASP, come to be

adopted by, and diffused within, SMEs?' by first summarising the key findings (Table 20) and then synthesising these to a model of the IS innovation life-cycle in SMEs (Figure 29).

| Diffusion phase | Diffusion stage | Key findings |
|---|---|---|
| **Adoption** | Initiation | Instigation factors:<br>• Internal: mainly perceived benefits (perceived by owner-managers)<br>• External: pressures from customers; other instigations can come from third parties and government funding<br>• Other factors include firm size specific such as new business formation in micro firms; and situation-specific such as opportunities/new projects<br>Instigation often driven by application need<br>Third parties can be very influential |
| | Matching | External search due to internal constraints (skills, resources, financial); previous experiences; perceived benefits |
| | | ASP discovery through internet; third-party firms; providers |
| | | ASP chosen because of internal constraints (skills, resources, financial); innovation characteristics; third-party influences; perceived benefits; provider characteristics |
| **Implementation** | Process | Characteristics: mostly perceived positive, teething problems found in all theatres<br>Can be responsibility of third-party firm |
| | Training | Options: no training; learning-by-doing; formal training from provider; formal in-house training<br>Owner-manager computer literacy is a factor |
| **Operation** | Integration | Integrated with respective systems and standalone solutions |
| | Support | Methods: telephone and e-mail<br>Most SMEs content with support but some not content |
| | Maintenance | Application: provider responsibility<br>Integrated systems ' parties maintain their respective ends' |
| | Contract | No SLAs |
| | Payment | Pay per use, pay per user, flat fees and combination of fee and payment per use/user<br>SMEs and/or third parties can make payments |
| **Consequences** | Desired | Operational, strategic and financial |
| | Undesired | Financial, related to ASP business model, System limitations; business implications |
| | Neutral | Understandings; changes in business processes and alterations for individuals |
| | Risks | Related to ASP business model; to application; to system aspects; to business aspects |
| **Discontinuation** | Instigation | Financial, internal, provider issues<br>Related to consequences |
| | Process | Perceived positive<br>Demonstrates ASP model flexibility |
| | Consequences | Desired and undesired<br>Can address undesired consequences but lead to loss of desired consequences |

**Table 20: Key findings**

Five diffusion phases (adoption, implementation, operation, consequences, discontinuation) tend occur in SMEs that adopt ASP-based computer applications. The diffusion commences with an adoption phase where an initiation and a matching stage prompt the SMEs to set-up an ASP-based application in an implementation phase. SMEs report that internal, external and other factors initiate their search for computer applications. Third parties can be influential in this initiation stage which is usually driven by an application need. The second stage within the adoption phase is matching where the SMEs (or third parties involved) match an ASP-based solution to the application need of the organisation. The choice for an ASP-based application over

other forms of application delivery is driven by internal constraints, specific characteristics of ASP, third-party influences, perceived benefits and provider characteristics. Initially, the SMEs did search for external solutions to their application needs as results of internal constraints, previous experiences and benefits perceived from an external realisation. The SMEs discovered their respective solutions in internet searches and from providers (that approached the SMEs). Another discovery channel is third-party firms that found ASP solutions for the SMEs. Following the adoption phase is the implementation phase where the SMEs put the ASP applications into use. The process of implementing the solutions was perceived as positive and smooth by the majority of SMEs. Some applications however created considerable teething problems for the firms following the initial set-up. In same cases, the implementation was the responsibility of third-party firms with no involvement from the SMEs. An additional focus besides the actual process of setting-up the application is on training on the new application. Four options (no training; learning-by-doing; formal training from provider; formal in-house training) are practiced by the SMEs whereby computer literacy of the owner-manager does play a role in the choice and array of options. Following the implementation are operation and consequences where the SMEs operate their applications on a daily basis and experience consequences. Issues relating to operation include integration of ASP solutions with other computer systems of the SMEs; support from the provider for the applications used by the SMEs; maintenance of the ASP solutions, contractual agreements between the SMEs and the ASP providers; and payment methods. The ASP solutions at the SMEs are either integrated with the respective systems or standalone solutions. Provider support is mostly over email and telephone and whereas most firms are content with the support supplied, a minority of SMEs is not. Maintenance of the ASP application is the responsibility of the provider in all firms yet, in cases where applications are integrated in a wider system, the firms involved maintain the respective ends of their systems. The SMEs have different contracts with their ASP providers but none has an service level agreement (SLA). The payment methods that ASP providers apply to get reimbursed for their ASP services vary: some SMEs pay on a per user/per use basis. Others pay a flat fee per annum and there are also combinations of flat fees with payment per user/per use. Some of the SMEs do not pay at all for their applications: other third parties such as customers or government agencies do pay for the applications. Four groups of consequences from ASP applications emerge: desired, undesired, neutral and risks. Desired consequences are of an operational, a strategic and financial nature. Undesired consequences include

system limitations, undesirable business consequences, financial burdens and specific issues relating to the ASP business model. The final phase is discontinuation where SMEs stop using the ASP solution. This phase consists of three sub-stages. This first sub-stage is instigation where financial, internal and provider issues can drive an SME to stop using the ASP solution. These issues are related to the consequences that the SME experiences. The second sub-stage is the actual process of stopping the usage. The SME that did stop using the ASP solution perceived this process to have been positive and as demonstrating the flexibility of the ASP mode of application delivery. The third sub-stage is the consequences that the SME experiences as a result of the discontinuation. These new desired and undesired consequences can potentially address previously undesired consequences. Yet, the discontinuation may also lead to the loss of previously desired consequences.

These key findings build the basis for a model of the IS innovation process in SMEs. Figure 29 shows how these key findings are synthesised into the model directed by the conceptual framework.

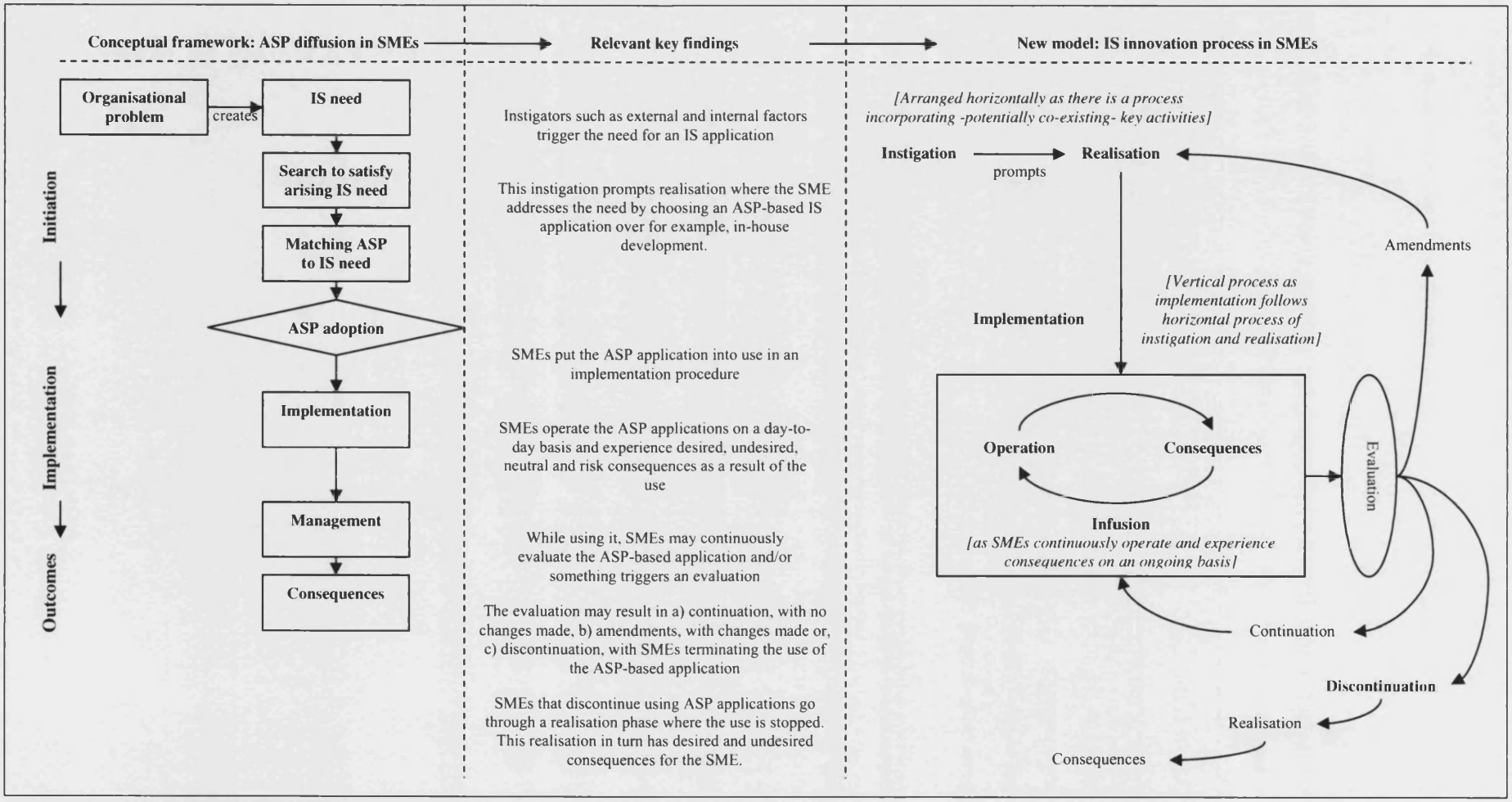


**Figure 29: Synthesising key findings into a model of the IS innovation process in SMEs**

The information systems innovation life cycle in SMEs commences with some form of 'Instigation'. In the case of ASP, this instigation stems from sources within SMEs, from sources outside SMEs, and from situation and firm size specific factors. These factors are often intertwined, hardly ever does one single factor instigate. The instigation phase prompts 'Realization' which satisfies the arising IS need with the decision to adopt a specific solution. For ASP in SMEs, the realisation phase usually incorporates an external search, a solution discovery, and matching of an ASP-based solution. These two phases are arranged horizontally as there is a process incorporating potentially co-existing activities. The two phases represent the initiation and matching stages of the adoption. Following the decision to adopt a specific IS solution in the realization phase an organisation installs the chosen solution in the implementation process and makes it available to its users. ASP implementation tends to be a positive experience for SMEs with different user training methods employed. This process is arranged vertically as implementation can only occur when a decision has been reached to adopt and application. Further, implementation is necessary for SMEs to progress into the following phases. Following implementation, the IS solution becomes part of the organisation, by way of 'Infusion'. This infusion contains the iterative cycle of operation and consequences as organisations have to operate the solution and experience consequences from it at the same time. Therefore, these two phases are arranged horizontally within an infusion box. The infusion continues until an 'Evaluation' takes place. This evaluation phase, which results in a decision, can be triggered and/or arise from continuous informal reviews. No formal evaluation takes place in SMEs, but owner-managers tend to continuously reassess ASP applications used. The outcome of the evaluation phase is a decision to either continue using an IS innovation; to make amendments to the innovation; or to discontinue using the IS innovation. All SMEs except one have decided to continue using the ASP-based applications. Two firms have come to understand that their ASP-solutions will need replacing at some stage but a discontinuation or amendment decision has not been reached. Whereas the continuation decision requires no action on behalf of the firm, an amendment decision takes the organisation back to the realization phase where changes are made. While the amendment decision may result in significant changes happing in an organisation, a discontinuation decision will foster changes that are linked to operation and consequences. The SME that decided to discontinue the use of the ASP solution for example no longer benefits from desired consequences but, on the other hand, is no longer exposed to risk associated with the ASP solution. The discontinuation

decision results in a realization phase which in turn ends in consequences. Evaluation, continuation and amendments are activities that are not directly visible from the key findings presented in Table 20. The reason for this is that the way the findings are structured, understandings are hidden between the different phases.

In conclusion, the model of the IS innovation process in SMEs consists of instigation, realisation, and implementation activities which result in operation and consequences. Operation and consequences become infused within the SMEs until an evaluation triggers an action that leads to amendments or discontinuation. Alternatively, the evaluation may result in no actions at all, when infusion continues. When SMEs decide to make amendments, these result in a link back to realisation. The diffusion ends when an SME decides to discontinue the use of the innovation by removing it. This discontinuation happens in a realisation step and it results in consequences for the SME from the stopped use.

### 9.6.1 Link to knowledge gap

The model of the IS innovation process in SMEs that emerges from the study of ASP covers the full life-cycle of the innovation. While it is a process model, it is not sequential in the sense that every single stage has to be completed before the other stage can commence (Cooper & Zmud, 1990, Rogers, 2003, Zaltman, et al., 1973). Instigation and realisation can co-exist but implementation can only happen after these two stages. Operation and consequences co-exist. Evaluation can be a one-off triggered or a continuous activity; it can have three outcomes: continuation, amendments and discontinuation. The evaluation and the three outcomes have not been observed in the diffusion literature before. One of the key strength of the model is that it covers the entire IS innovation diffusion process. It is not restricted to specific stages such as adoption. The adoption-bias is a significant shortcoming of the existing IS innovation diffusion literature and can be observe in different studies (Brancheau & Wetherbe, 1990, Hu, et al., 1997, Loh & Venkatraman, 1992, Moore & Benbasat, 1991). Operation, consequences, evaluation and its outcomes are therefore important contributions to the diffusion literature. The only other model of the IS innovation process available for organisations was developed by Cooper and Zmud (1990) more than a decade ago. This model (Figure 4), which has not been tested in an SME context, exhibits sequential stages and does not explicitly cater for consequences.

Another strength of the model is that it represents a generalisation about IS innovations in SMEs (Grover, et al., 1997, Mustonen-Ollila & Lyytinen, 2003, Swanson, 1994). This generalisation, i.e. the model, offers itself for further testing in future research. The research, including the model also address some of Currie's (2004a) and Swanson's (1994) concerns that few empirical studies exist which examine how IS innovations come to be adopted and diffused across organisations: it offers understanding about IS innovations in SMEs that emerge from empirical evidence.

While the model does follow the general patterns (Wolfe, 1994, p.411) that innovation diffusion process models display, it supplements existing literature on IS innovation diffusion in SMEs (Kendall, et al., 2001, Panizzolo, 1998, Premkumar, 2003, Santarelli & D'Altri, 2003, Sillince, et al., 1998, Thong, 1999) which does not supply a complete model of the diffusion process for SMEs. Again, one of the strength of the model is that it includes operation, consequences and outcomes of evaluations which have not been observed before.

## 9.7 Chapter summary

This chapter addresses the research question and discusses higher level findings. The two core contributions emerging from the cross case analysis are empirical evidence from SMEs about ASP and the resulting model of the IS innovation life-cycle in SMEs. The findings from the research are discussed in light of the existing literature particularly in terms of ASP propositions and innovation diffusion models in organisations. The following chapter provides concluding observations and remarks.

# 10 CHAPTER TEN: CONCLUSIONS

This closing chapter brings together the findings from the previous chapters in a holistic manner: it synthesises what has been learned from investigating the diffusion of ASP among SMEs. This includes reflecting on relevant literature, detailing the various contributions made, outlining limitations, and suggesting areas for further research. Section 10.1 considers the different phases that SMEs go through when they adopt ASP-based computer applications. Section 10.2 presents the general understandings about ASP in SMEs generated by this study. Section 10.3 discusses practical implications for micro, small and medium-sized firms and for e-commerce in SMEs. The section concludes by identifying the practitioner audience. The following section 10.4 presents the limitations of the research. The chapter concludes with suggestions for further research.

## 10.1 ASP diffusion phases in SMEs

This section reflects on the four principal phases that SMEs experience when they adopt ASP. Figure 30 illustrates these four phases by mapping them onto the model of the IS innovation process in SMEs developed in Figure 29.

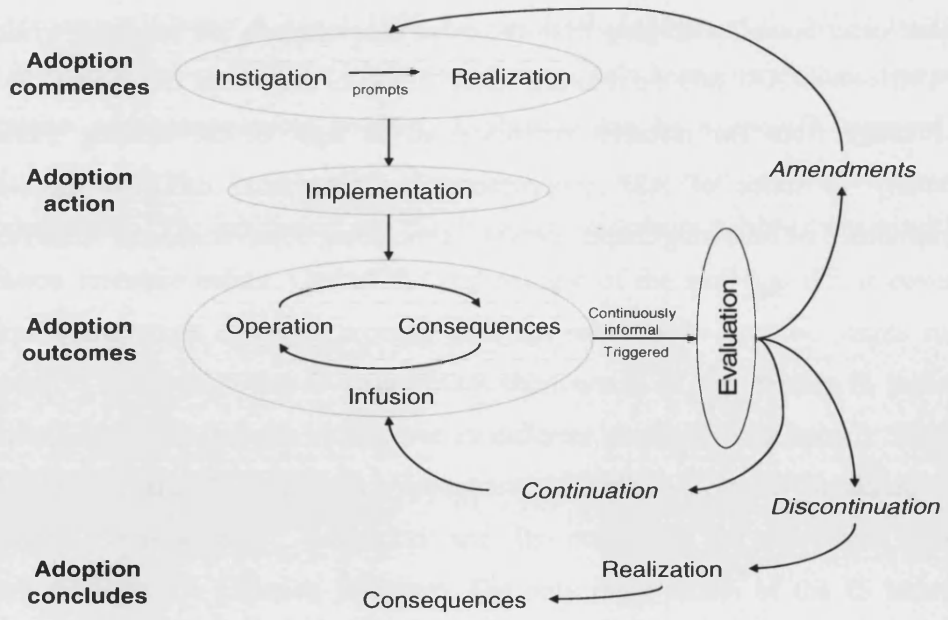


**Figure 30: The IS innovation life-cycle in SMEs**

### 10.1.1 The beginning and motives for ASP adoption in SMEs

For SMEs, the ASP adoption process is twofold: it consists of some form of instigation where the SME comes to understand that it has a need for a computer application; and the realisation where it chooses the ASP model to satisfy the arising application need. These two intertwined actions of identifying a need and searching for a solution to the need have not been considered in the IS adoption and IS innovation adoption in SMEs literature. Similarly, ASP adoption propositions do not cater for this dual-natured notion. A particular issue is that the aforementioned disciplines do not differentiate between factors that instigate needs and factors that influence realisation. A result of this lack of differentiation is that the ASP adoption factors proposed are many and varied. Furthermore, these factors are interacting and often inseparable. Although there has been a richness of factors observed in these disciplines this is not matched by the number of factors presented in the innovation diffusion literature. This discipline supplies two stages leading to an adoption decision. By introducing the dual nature of IS innovation adoption to the ASP and IS adoption in SMEs literature, this research bridges a gap, in particular a gap between disciplines.

Additionally, this approach facilitates the basis for organising the many factors proposed and available by arranging them accordingly. Internal, external and specific factor (relating to issues such as firm size and situation) categories observed in the instigation activity have previously been identified in the IS adoption in SMEs and IS innovation in SMEs discipline. The factors in the other activity, realisation, reveal why SMEs have chosen ASP to satisfy their arising application needs: mostly it has been due to internal constraints, lack of skills in particular, and characteristics of the ASP model. These two core factors are complemented by perceived benefits, provider characteristics and third-party influences. These findings are significant as there have been lots of propositions about SME motives for ASP adoption but little proof in empirical terms.

Not only does this research provide evidence for SME motives for ASP adoption, it also uncovers how SMEs have discovered their respective ASP solutions. The three discovery mechanisms are the internet, third-party firms and ASP providers. Neither the ASP, the IS adoption/IS innovation adoption in SMEs or the innovation diffusion literature provide information about how firms come to adopt computer applications. There is a strong bias in the literature towards asking why questions. The ability to provide an exploratory answer to this 'how' question is a contribution to the literature.

One finding that has not been observed before is the influence of third-parties on IS choices in SMEs. These third-parties include customers, business partners and government agencies. While the external factor group does imply that these third-parties influence SME motivation for adoption, their influence on how the SMEs come to adopt something has not been observed before.

### 10.1.2 The action of adopting the ASP application: the implementation process

Questioning how SMEs come to set-up ASP applications reveals that ASP propositions applicable to the implementation process are appropriate: ASP does foster faster software implementation (Cherry Tree & Co., 1999, Currie, 2003, Kern, et al., 2002b, Weerakkody, et al., 2003, Weiss, 2001) with the important benefit of reduced complexities involved in installing software (Dewire, 2000). These are key advantages of ASP which, as a result, can enable SME access to applications in a relatively short time span. Although complexity overall is relatively low, there are varying degrees of complexity depending on necessary integration of ASP applications with other IS. The lowest level of complexity is where SMEs adopt standalone solutions.

The other focus of interest in the implementation process is the training that is needed to start using the ASP application. The IS in SMEs (Caldeira & Ward, 2002, Fink, 1998, Grandon & Mykytyn, 2004, Heikkila, et al., 1991, Premkumar, 2003, Riemenschneider, et al., 2003)Caldeira & Ward, 2002, Fink, 1998, Grandon & Mykytyn, 2004, Heikkila, et al., 1991, Premkumar, 2003, Riemenschneider, et al., 2003) and IS innovations in SMEs (Panizzolo, 1998) literature alerts adopters that training is a critical implementation success factor. The findings of this study do not support this notion but emphasise that learning-by-doing is widely spread and user training only complements this informal way of learning how to use a new application.

### 10.1.3 The outcome of the ASP adoption: operation and consequences

As identified in the literature review, there is a tendency in the IS in SMEs literature to focus on the initial stages of the IS adoption process. This bias is also evident in the

innovation diffusion discipline (Rogers, 2003) and it is beginning to occur in the ASP area where empirical investigations (Heart & Pliskin, 2002, Johansson, 2003, 2004, Lockett, et al., 2006) study the initial stages of the process. The findings relating to the outcome of the ASP adoption are therefore important contributions of this study.

The outcomes are divided into operational issues and consequences. The five operational issues are integration of the ASP application with other in-house IS; vendor support for the SME; maintenance of the ASP application; contracts between vendor and SME; and payment methods. The most striking findings in the operations group are that SMEs do not have service level agreements with their providers and that different methods of payment are used. Unexpectedly, in some instances where ASP applications are e-commerce solutions, SMEs do not pay for the ASP services: third parties such as customers and government agencies reimburse ASP providers for their services on behalf of the SMEs.

Consequences appear as desired, undesired, neutral and risks. Within these four types are different categories such as operational, strategic and financial desired consequences. All SMEs experience some consequences although not all experience all four types. All firms report desired consequences and risks. All but one small firm report undesired consequences. Half of the SMEs experience neutral consequences. These are understandings, for example about the scope of the ASP delivery model, and minimal business process changes. The majority of ASP propositions in the literature promote the positive effects of ASP for SMEs. The findings from this research illustrate that the majority of these positive effects exist. ASP, for example, does enable micro firm owner-managers to focus on core competencies and it does provide efficiency gains for medium-sized firms. Undesired consequences include system limitations, undesirable business consequences, financial burdens and specific issues relating to the ASP business model. A finding that challenges literature propositions on cost (Cherry Tree & Co., 1999, Currie, 2003, Curtis, 2000, Dewire, 2000, iT2, 2002, Kern, et al., 2002b, Lockett, et al., 2006, Weerakkody, et al., 2003) is that ASP can have unwelcome financial effects for SMEs. Yet, some SMEs report desired financial effects. These findings as well as the contrasting conclusions from Johansson (2003) and Lockett et al. (2006) with regards to financial implications illustrate that cost is a double-edged sword: it is open to interpretation by the individual. One SME owner-manager, for example, may interpret the cost of ASP to be low, based on his/her previous experiences

whereas another owner-manager may consider the same cost to be high. The two significant undesired consequences of ASP are system limitations and provider issues. Whereas the system limitations matter demonstrates that many SMEs are dissatisfied with the scope of their ASP applications, the provider issues point towards problems originating from the relationship element of the ASP model. The risks that SMEs identify are related to the ASP business model; to the application; to system aspects and to business aspects. While some of these risks have been proposed, others such as lack of industry standard solutions are new.

Operation and consequence findings reflect the fact that ASP incorporates different elements: an application, a provider, a network, a customer, and different relationships. While altogether these make up the ASP model, effects can emerge from one single element or a combination of elements. This issue needs to be considered when doing research on ASP and interpreting the findings emerging from this study.

### 10.1.4 Concluding the adoption of ASP: continuation, changes, or discontinuation?

While ASP applications do infuse within SMEs, evaluations can trigger SME actions regarding the use of ASP applications. These actions can be to make changes to an existing application or to stop using the application. Alternatively, SMEs can continue as previous, making no changes after an evaluation has taken place. The cycle continues when continuation and changes are chosen. It only comes to an end when the SME decides to discontinue the use of ASP. In that case, the SME realises the discontinuation by removing the application, terminating the contract with the ASP provider. This realisation in turn has consequences for the SME such as eliminating undesired consequences and losing previously enjoyed desired consequences. This conclusion regarding the ASP diffusion cycle in SMEs has not been observed in the literature before.

## 10.2 Understandings generated about ASP in SMEs

This section provides evidence for the claim that ASP does not revolutionise IS provisioning in SMEs. Further, it identifies the key beneficiaries of the ASP mode of

delivery; it argues that ASP can be an e-business catalyst for SMEs; and it claims that ASP displays classic diffusion symptoms.

### 10.2.1 ASP does not revolutionise IS provisioning in SMEs

Practitioner and early academic ASP literature indicates that ASP will revolutionise IS provisioning in SMEs (Cherry Tree & Co., 1999, Currie, 2003, Dewire, 2000, iT2, 2002, Kern, et al., 2002b, Walsh, 2003, Weerakkody, et al., 2003). This study finds little evidence that ASP can fulfil this promise. First, the one-to-many approach, one application for many different clients, does not take into account the diversity of SMEs: application needs are wide and varied and even though an ASP-based application may fit the needs of one SME it may not suit the specific circumstances of many other SMEs. SMEs are critical of the fact that changes to applications, which would result in a better organisational fit, are often not possible. SMEs, for example, suffer from system limitations. This is an indication that the scope of ASP applications is limited and that this type of application delivery does not offer scope to tailor applications to the needs of SMEs.

Standard ASP applications such as e-statistics and e-SMS provide few significant benefits for SMEs. ASP providers need to supply applications that address the needs of SMEs and offer significant benefits over other forms of application sourcing. This conclusion underlines the notion that ASP providers tend not to understand SME requirements and offer solutions unsuitable for SMEs (Currie, 2003, 2004b).

The cost benefit promoted in the early ASP literature (Cherry Tree & Co., 1999, Currie, 2003, iT2, 2002, Kern, et al., 2002b, Weerakkody, et al., 2003) is a double edged sword: while ASP involves little upfront investment, it entails continuing payments to the provider. Hence, it is not surprising that ASP adoption rates among SMEs are low (Currie, 2003, Johansson, 2004, Susarla, et al., 2003).

### 10.2.2 ASP suits entrepreneurs and micro firms

The ASP model suits entrepreneurs and micro firm owner-managers. First, it gives them rapid access to applications as applications procured via the ASP model can be deployed within a short time. Second, it enables entrepreneurs and owner-managers to

focus on core activities. This can be advantageous when entrepreneurs are in the process of setting-up a new firm and when owner-managers need to concentrate on generating income. As 50% of newly formed enterprises cease trading within three years of being set up (Burns, 2001) this is an important benefit. Third, SMEs are generally typified by skill and resource poverty (Burns, 2001, Levy & Powell, 2005). ASP supports newly formed enterprise and micro and small firm development by giving them access to computer skills and resources. This may increase their chances of survival and it may foster their capacity for change and growth. Growing firms for example, tend to rapidly outgrow resources (Slatter, 1992) and ASP can address shortages related to computer skills and application needs.

### 10.2.3 ASP can be an e-business catalyst for SMEs

While the ASP business model is considered immature (Currie, 2004b), it can be a catalyst for e-business in SMEs. ASP applications offered by providers include full e-commerce suites (e-ticketing) and specific e-commerce functions such as e-payments. SMEs can procure these different types of applications through the ASP model giving them access to the e-market. SMEs tend to operate in single markets or a limited range of markets (Burns, 1996, 2001) and ASP gives them an opportunity to operate in this new market.

### 10.2.4 ASP displays classic diffusion symptoms

Both researchers (Currie, 2003, Johansson, 2004, Susarla, et al., 2003) and practitioners recognise that not many SMEs have adopted ASP-based applications. While this research does not explicitly test for non-adoption, the findings provide evidence that ASP displays classic symptoms of innovation diffusion

First, ASP is a hype victim: the predictions about its potential were excessive. As Rogers notes on the first page of his book 'Diffusion of Innovations', 'many innovations require a lengthy period of many years from the time when they become available to the time when they are widely adopted' (2003, p.1). ASP is no exception: while it has obvious advantages, it is diffusing at a slow rate among the SME population, its key client group.

Second, ASP, as an internet-based innovation, is a victim of the short lifespan of internet innovations: in the internet-age innovations do change rapidly and the term ASP was forgotten nearly as quickly as it was termed. The underlying premise of renting applications from providers for a fee does remain but the concept is evolving and ASP is being embraced by web services, hosted services and other forms of internet developments. The conclusion therefore is that ASP is a victim of the low sustainability of internet-induced innovations.

Third, many SMEs may actually use ASP-based applications but they are not aware of it. Some of the participating SMEs had never heard of the term ASP. Yet, they are using ASP-based applications. Lack of awareness is also relevant in another sense: many SMEs are not aware that they can rent applications over the internet. During the design phase (searching for potential participants), when many SMEs were contacted to find out about their computing infrastructure this lack of awareness was all too obvious.

Fourth, unless there is a specific application need, SMEs tend not to explore application provisioning options. And ASP is just one of the options available to SMEs if they are or are made aware of it. This notion emphasises the conclusion from Levy and Powell (Levy & Powell, 2000) that SMEs usually decide to use their limited resources in response to a specific identified need. What needs to be communicated to the business community is that the rental option does give SMEs easy access to computer applications without initially exhausting their already limited resources.

## 10.3 The significance of ASP for SMEs: implications for practice

This study provides empirical evidence from SMEs about ASP which give rise to new insights about the ASP model in SMEs. The following sections synthesise these insights and discuss their implications for the various stakeholders. The concluding section identifies and discusses the target audience for these findings.

### 10.3.1 For micro and start-up firms

The ASP model offers entrepreneurs the possibility to acquire computer applications fast and hassle-free. The pre-requisite however is that the entrepreneurs are already

aware of this kind of computer application rental; or that they find such solutions on the internet; or are being directed towards them by third-parties such as business partners or government organisations. ASP does give entrepreneurs and micro firm owners applications that are within the scope of their IS needs. Most importantly, these stakeholders can concentrate on setting-up and developing their businesses without having to worry about their computer applications. Of particular importance to micro and start-up firms is that ASP applications do not require a huge amount of computer skills and up-front cost. Unless an entrepreneur/owner-manager is computer-literate or has somebody at hand that can provide computer knowledge at reasonable cost (such as a family member or an employee) ASP provides a low-cost alternative for access to computer skills.

With these positive issues however come some warnings: micro firms do outgrow the scope of the applications by, for example, going through a period of business growth where new employees join the firm. As a result, the ASP applications may no longer fully cover the application needs of the firm. For an SME that pays for its ASP application on a per user or per use basis business growth can be the source of some significant financial pressure when users or use increases. In the long term, the ongoing cost that seemed little when the application was adopted may become a financial burden or even increase overall cost at the firm as it continually has to be paid. Another danger is the dependence on an external source for application delivery and data management. Relationships between firms and providers can become problematic or even break down entirely. As a result, micro firms can be forced to arrange for alternative applications to fulfil IS needs. ASP can provide a short-term fix for micro firm IS application needs but its long term potential is questionable.

### 10.3.2 For small firms

In small firms, owner-managers who see the potential benefits of new IS applications to the firm as an entity are responsible for ASP adoption. These types of firms display a noticeable dependency on external third parties who influence owner-manager adoption decisions and choices of applications. The applications adopted provide the small firms with new business opportunities with the focus being on developing the e-business sides of the firms. The scope of the ASP applications adopted in small firms is wide: applications range from providing simple add-on functions to full e-commerce

applications integrated with key in-house systems. Effects from ASP applications are linked to these levels of complexity. Following the continued use of ASP applications small firms tend to discover system limitations of complex solutions and tend to be unhappy with the providers approach to eradicating these limitations.

### 10.3.3 For medium-sized firms

The direct effects of ASP applications are mainly felt in single departments in medium-sized firms. Effects on the firm as a whole tend to be indirect. None of the ASP applications adopted by medium-sized firms have been rolled out company-wide. It is single departments that have adopted ASP applications. While in all the firms top management approved the adoption decisions, it was left to the departmental managers to arrange the adoption. In the theatres, general management was more involved in the decision and implementation process than in the other two firms. Medium-sized firms adopt ASP applications for a variety of strategic reasons which are identified by a mix of individual department managers and top management. Application complexity levels in medium-sized firms tend to be at the higher end with applications requiring higher levels of in-house attention than, for example, in micro firms.

Medium-sized firms, like micro and small firms, often come to realise that ASP applications can have considerable limitations and are not able to satisfy the requirements of the firms at 100%. The relationship element of the ASP model is another potential source of headaches for medium-sized firms.

### 10.3.4 For e-commerce in SMEs

The ASP model offers a straightforward, affordable and accessible route for SMEs to get into e-business. More than half of the applications adopted by the firms are e-business related: applications range from e-add-ons such as website statistics, to e-supply, to e-communication in the form of e-mail, and to full e-commerce suites such as providing e-ticketing for theatres. ASP therefore can be an e-business catalyst for SMEs. Firms that want to get into e-commerce may be particularly interested in ASP-based applications.

SMEs however need to be aware that e-commerce ASP applications do bear e-commerce typical disadvantages such as the exposure to fraud. Providers cannot protect SMEs from the effects of these disadvantages. Some of the SMEs in this study, for example, have been caught up in credit card frauds. SME also should be aware that ASP-based e-commerce applications are only as good as their providers make them and that it is difficult as an ASP customer to force providers to make changes to ASP applications. The one-to-many approach favoured by many ASP providers often results in problematic relationships between SME customers and ASP providers. SMEs often feel treated as one-of-many when ASP providers ignore their concerns.

### 10.3.5 Practitioner audience

The findings from this study are relevant for SMEs, ASP providers and government organisations such as the UK Small Business Service and Regional Development Agencies.

SME owner-managers will find it interesting to know that ASP can provide them with readily available IS applications. Many ASP-based solutions supply SMEs with e-commerce applications that are easy and quick to set-up, offering the flexibility of an easy route out. ASP-based applications require little upfront capital investment and give SMEs access to skills often not available in-house. SME owner-managers should choose ASP providers carefully as the SME-provider relationship is a critical element that can be a source of significant problems. In rural areas, where physical broadband internet access may not be readily available, ASP-based applications may not function properly due to latency issues originating from slow internet connections. SMEs interested in adopting particular applications such as e-mail or e-ticketing may find the outcomes discussed in the previous chapter interesting as they can help them making better informed decision about ASP-based IS. SMEs already using ASP-based applications may find it interesting to know what other firms experience with their respective applications. Theatres, for example, may find it noteworthy that the same provider charges one of them a flat fee whereas the other three have booking fees imposed upon their online customers. Micro firm owners, as well as entrepreneurs, should come to understand that ASP-based applications are a quick and easy way of access to IS and IT skills whilst enabling them to focus on their core business activities.

The findings from this study are relevant for ASP providers as they present valuable feedback from SME customers. Core for ASP providers is that, in order to satisfy SME customers, their applications need to be of superior quality and their service to their customers needs to be excellent. Most SMEs report system limitations - the ASP providers studied should address these limitations. Where SMEs describe dissatisfaction with services offered by their ASP provider, these vendors should improve their customer service. SMEs often become aware of ASP applications over the internet and partner firms pointing them towards it. ASP providers can exploit these communication channels to increase awareness of their services among potential SME clients.

This study has practical implications for UK government agencies. More than half of the SMEs studied were not aware that their applications were ASP-based applications although the firms did recognise the network component. Government agencies can use the findings of this study to raise awareness among SMEs and communicate potential benefits and drawbacks of using ASP-based applications to SMEs and ASP providers. ASP has the potential to be a catalyst for e-commerce in SMEs. Events such as road-shows could introduce SMEs to the ASP concept and include presentations about applications available via the ASP model and information about potential providers. Government agencies could further develop a register of applications and providers operating in the UK with the aim better to inform SMEs.

## 10.4 Limitations

While an interpretive research strategy adds depth and makes important contributions to this field of enquiry, it remains open to criticism regarding bias and its inability to make statistical generalisations to populations of organisations. While all possible steps have been taken to minimise bias and increase generalisability, findings may be interpreted differently by other researchers. Tactics to overcome bias were, for example, to collect data from different respondents at different points of time; and the use of a conceptual framework to guide the research through the various phases. One of the difficult issues was to address information overload. Sequential cycles of data reduction and data display in the analysis process helped to tackle this problem.

Another limitation originates from SME research: making generalisations from SME research, however well conducted, will always offer conclusions whose wider

applicability will be easy to challenge (Curran & Blackburn, 2001). As the vast majority of businesses in many economies are SMEs, the population, in many respects, is heterogeneous. This makes generalisations from SME research difficult. The quality of the findings from this research will increase when conclusions (particularly Figure 30) are tested on a wider scale by other researchers. Certain theoretical and practical insights, however, may not hold in other organisational settings.

A further limitation is related to the limited amount of data available. Overall, fourteen interviews were conducted during the design phase and findings are based on thirty-seven interviews. Although satisfactory from the point of view of the researcher, conceptual saturation may be questioned by other researchers. It is open to debate whether additional case studies would have resulted in a more complete view of ASP diffusion in SMEs. This sampling strategy, which is driven by access rather than theory, is open to criticism; yet future research, as proposed in the following section, can reduce this limitation.

A sample structure comprising of six different applications in SMEs ranging in size from one employee up to two-hundred-fifty employees, operating in different industries and regions, may be open to criticism. Studying the same ASP-based applications in different settings or studying different ASP applications in the same industry or among same-sized firms may have resulted in very different contributions.

A potential criticism regarding data analysis is the use of figures to analyse data and draw cross case conclusions. This is a reflective interpretive approach to analysis and is open to interpretation by other researchers who may draw different conclusions using other methods of data analysis.

## 10.5 Areas for further research

This research provides a valuable foundation for the study of ASP and IS innovations in SMEs. However, it is exploratory in nature and findings and conclusions presented suggest several directions for further research.

The first avenue for further research is to build on the findings from this inquiry and validate the model of the IS innovation process in SMEs in a wider context. The model

could, for example, be tested for different IS innovations and for different kind of SMEs in various regions and countries. Types of SMEs could include micro and/or small firms in the manufacturing or service sector in a specific region of the UK. Another approach would be to test the model among SMEs in the UK, Europe and the USA and identify differences and similarities in these countries. One way of testing the model on a larger scale could be to use a survey data collection method. Another approach would be to expand the scope of the model by examining its applicability in an IS in SMEs context. Future studies could, for example, study the life cycle of IS in SMEs and compare the findings to the model of the IS innovation process in SMEs. This line of inquiry represents the validation stream of the areas for further research.

In terms of further empirical studies about ASP in SMEs, researchers may find it interesting to study different ASP solutions in various SMEs. Possible lines of enquiry include ASP for start-up and micro firms, ASP-based e-ticketing in theatres and cinemas, ASP in certain regions, etc. Combination of options and resulting research opportunities are countless in the emerging field of ASP in SMEs. A potentially interesting future research opportunity, not restricted to solely SMEs, is the study of an ASP-based e-supply network. Using theories other than diffusion of innovation may provide rich understandings about ASP in SMEs.

Another potential line of enquiry is situated in the subject of IS innovation diffusion in organisations. It would be interesting to test the model developed in this thesis in other contexts and settings. More research on implementation, outcomes and confirmation phases is needed as diffusion does not terminate with adoption. Diffusion studies on SMEs may also provide valuable insights for a majority of organisations. It would, for example, be interesting to investigate how innovation awareness among SMEs is generated. Going away from survey-based inquiries, using more qualitative research approaches may establish these methods further in the diffusion of innovations discipline.

Other opportunities for further research exist in comparing ASP-based applications with other forms of application sourcing and in-house development in organisations. One line of inquiry, for example, could be to study e-ticketing in art venues and compare the different methods employed to satisfy e-ticketing needs. Another area of interest could

be the study of different online payment methods and cost implications for SMEs arising from the various types of payments.

## 10.6 Chapter summary

This chapter provides the concluding remarks regarding ASP in SMEs. It considers implications for micro, small and medium-sized firms and the role of ASP for e-commerce in SMEs. It further identifies the target audience for these implications. The chapter continues by outlining limitations arising from the underlying research method, the sampling strategy and the data analysis technique. The chapter concludes by identifying areas for further research such as validating the model of the IS innovation process and suggesting future lines of inquires in the ASP, ASP in SMEs, and IS innovation diffusion domains.

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# Appendix

## Overview of IS in SMEs articles published between 1995 and 2005

| Jour. | Vol | Title | Reference |
|---|---|---|---|
| MISQ | 28(3) | Small business growth and internal transparency: the role of information systems | Street et al (2004) |
| | 21(3) | Personal computing acceptance factors in small firms: a structural equitation model | (Igbaria, et al., 1997) |
| | 19(4) | Electronic Data Interchange and Small Organizations: Adoption and Impact of Technology | (Iacovou & Benbasat, 1995) |
| ISR | 16(1) | Collaborating on Multiparty Information Systems Development Projects: A Collective Reflection-in-Action View | (Zhu & Kraemer, 2005) |
| | 15(1) | A Practice Perspective on Technology-Mediated Network Relations: The Use of Internet-Based Self-Serve Technologies | (Schultze & Orlikowski, 2004) |
| | 8(2) | Executive Decisions About Adoption of Information Technology in Small Business: Theory and Empirical Tests | (Harrison, et al., 1997a) |
| | 7(2) | Top Management Support, External Expertise and Information Systems Implementation in Small Businesses | (Thong, et al., 1996) |
| JMIS | 15(4) | An Integrated Model of Information Adoption in Small Businesses | (Thong, 1999) |
| EJIS | 14(4) | A framework to assess the factors affecting success or failure of the implementation of government-supported regional e-marketplaces for SMEs | (Gengatharen & Standing, 2005) |
| | 13(2) | A model of electronic commerce adoption by small voluntary organizations | (MacKay, et al., 2004) |
| | 13(2) | Organizational determinants of IT adoption in the pharmaceutical distribution sector | (Bruque-Camara, et al., 2004) |
| | 12(2) | Using resource-based theory to interpret the successful adoption and use of information systems and technology in manufacturing small and medium-sized enterprises | (Caldeira & Ward, 2003) |
| | 12(1) | SMEs, co-opetition and knowledge sharing: the role of information systems | (Levy, et al., 2003) |
| | 11(4) | Benchmarking IT practices in small firms | (Cragg, 2002) |
| | 11(2) | IT alignment in small firms | (Hussin, et al., 2002) |
| | 10(1) | Information systems strategies in knowledge based SMEs: the role of core competencies | (Duhan, et al., 2001) |
| | 9(2) | Business environment and internet commerce benefit – a small business perspective | (Poon, 2000) |
| | 8(4) | Evaluation of information technology: strategies in Spanish firms | (Huerta & Sanchez, 1999) |
| | 7(4) | Evaluating information systems in small and medium-sized enterprises: issues and evidence | (Ballantine, et al., 1998) |
| | 5(3) | End user computing sophistication and success in small firms | (Zinatelli, et al., 1996) |
| | 4(1) | Matching Information Technology and Organizational Structure - An Empirical Study with Implications for Performance | (Raymond, et al., 1995) |
| ISJ | 12(3) | Constructing a web information system development methodology | (Vidgen, 2002) |
| | 12(2) | Understanding the successful adoption and use of IS/IT in SMEs: an explanation from Portuguese manufacturing industries | (Caldeira & Ward, 2002) |
| | 8(3) | Towards a framework for business process re-engineering in small and medium sized enterprises | (Chang & Powell, 1998) |
| JSIS | 13(4) | Coping with ERP-related contextual issues in SMEs: a vendor's perspective | (Liang & Xue, 2004) |
| | 12(3) | Technology fears: distrust and cultural persistence in electronic marketplace adoption | (Hsiao, 2003) |
| | 11(2) | IT alignment and firm performance in small manufacturing firms | (Cragg, et al., 2002) |
| | 10(3) | Receptivity of Singapore's SMEs to electronic commerce adoption | (Kendall, et al., 2001) |
| | 9(1) | Information systems strategy for small and medium sized enterprises: an organisational perspective | (Levy & Powell, 2000) |

# Journal descriptions

(Please note: all descriptions were accessed in May 2006)

| Journal | Description | Available at |
|---|---|---|
| MISQ | The editorial objective of the MIS Quarterly is the enhancement and communication of knowledge concerning the development of IT-based services, the management of information technology resources, and the economics and use of information technology with managerial and organizational implications. | http://www.misq.org/ |
| ISR | ISR (Information Systems Research) is a journal of INFORMS, the Institute for Operations Research and the Management Sciences. Information Systems Research is a leading international journal of theory, research, and intellectual development, focused on information systems in organizations, institutions, the economy, and society. | http://isr.pubs.informs.org/index.htm |
| JMIS | The journal is a widely recognized forum for the presentation of research that advances the practice and understanding of organizational information systems. It serves those investigating new modes of information delivery and the changing landscape of information policy making, as well as practitioners and executives managing the information resource. A vital aim of the quarterly is to bridge the gap between theory and practice of management information systems.<br>The journal accepts empirical and theoretical submissions that make a significant contribution to the field of management information systems. Such contributions may present:<br>• experimental, survey-based, or theoretical research relevant to the progress of the field<br>• paradigmatic designs and applications<br>• analyses of informational policy making in an organizational, national, or international setting<br>• investigations of social and economic issues of organizational computing<br>Analytical attention is focused on the following issues:<br>• Information systems for competitive positioning<br>• Business processes and management enabled by information technology<br>• Business value of information technology<br>• Management of information resources<br>• Integration of information systems planning into business plans<br>• Business globalization and information technology<br>• Relationship between information technology and organizational performance and structures<br>• Enterprise-wide systems architectures and infrastructures<br>• Electronic commerce and net-enabled organizations<br>• Robustness and security of information-technology infrastructures<br>• Informational support of collaborative work<br>• Knowledge management, organizational learning, and organizational memory<br>• Systems sourcing, development, and stewardship in organizations<br>• The human element in organizational computing<br>• Data- and knowledge-based system architectures | http://jmis.bentley.edu/profile/ |
| EJIS | The European Journal of Information Systems provides a distinctive European perspective on the theory and practice of information systems for a global audience. We encourage first rate research articles by academics, but also case studies and reflective articles by practitioners. We provide a critical view on technology, development, implementation, strategy, management and policy. | http://www.palgrave-journals.com/ejis/scope.html |
| ISJ | The Information Systems Journal (ISJ) is an international journal promoting the study of, and interest in, information systems. Articles are welcome on research, practice, experience, current issues and debates. The ISJ encourages submissions that reflect the wide and interdisciplinary nature of the subject and articles that integrate technological disciplines with social, contextual and management issues, based on research using appropriate research methods.<br>The ISJ has particularly built its reputation by publishing qualitative research and it continues to welcome such papers. Quantitative research papers are also welcome but they need to emphasise the context of the research and the theoretical and practical implications of their findings.<br>The ISJ does not publish purely technical papers. | http://www.blackwellpublishing.com/aims.asp?ref=1350-1917&site=1 |

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|---|---|---|
| JSIS | The Journal of Strategic Information Systems focuses on the management, business and organizational issues associated with the introduction and utilization of information systems as a strategic tool, and considers these issues in a global context. The emphasis is on the incorporation of IT into organizations' strategic thinking, strategy alignment and management of change issues. The journal publishes research and case study papers from around the world which:<br>• investigate the very nature of business in the context of emerging IT<br>• discuss the justification and evaluation of information systems<br>• discuss the organizational implications of IT<br>• consider how organizations have been transformed as a result of the astute management and application of IT<br>A transdisciplinary approach/perspective is welcome.<br>Topics covered include<br>• organizational transformation on the back of information technology<br>• information systems/business strategy alignment<br>• inter-organizational systems<br>• global issues and cross-cultural issues<br>• the impact and significance of emerging information technologies (e.g. internet, intranets) | http://www.elsevier.com/wps/find/journaldescription.cws_home/525447/description#description |
| I&M | Information & Management serves managers, professionals, database administrators and senior executives of organizations which design, implement and manage Information Systems Applications. The major aims are:<br>• To collect and disseminate information on new and advanced developments in the field of applied information systems;<br>• To provide material for training and education in administrative data systems;<br>• To encourage further progress in information systems methodology and applications;<br>• To cover the range of information system development and usage in their use of managerial policies, strategies, and activities for business, public administration, and international organizations;<br>• To provide guidelines and insights on how to undertake successful information technology initiatives and learn to avoid failures through the study of success and failure patterns (Section SOS). | http://www.elsevier.com/wps/find/journaldescription.cws_home/505553/description#description |
| JIT | The Journal of Information Technology is of interest to academics, scholars, advanced students and reflective practitioners in management science, information systems and computer science disciplines. The journal will also inform those seeking an update on current experience and future prospects in the areas of contemporary information and communications technology. | http://www.palgrave-journals.com/jit/index.html |
| SBE | Small and medium-sized firms have become increasingly important in the economic activities of both developed and developing nations. Small Business Economics provides the central forum for the economic analysis of the role of small business. In particular, articles are welcomed that focus on the links between firm size and performance, the distinct roles of differently sized firms, how and why firm behavior and strategy vary with size, the determinants of the formation, growth, and dissolution of firms and the relationship between firm size and innovation. Small Business Economics is cross-disciplinary and cross-national in its approach. High quality research is published employing theoretical or quantitative analyses, along with contributions focusing on institutions and public policies, within both a national and international context. | http://www.springer.com/uk/home?SGWID=3-102-70-35745940-detailsPage=journal\|description&SHORTCUT=www.springer.com/journal/11187/about |
| ISBJ | The International Small Business Journal is a truly global, multi-disciplinary forum for the dissemination and discussion of research on the small business. The emphasis of the journal is on high quality, research based studies which contribute to theory, critical understanding and policy formulation on small firms.<br>Papers published in the ISBJ cover theoretical, methodological and empirical studies of small firms from a broad range of disciplines and perspectives. The emphasis is on research excellence in the field of enquiry, as the journal endeavours to provide a critical forum for world class contributions on the analysis of small firms.<br>This refereed journal is of relevance to academics, policy makers and analysts, in government and business, seeking to understand the sector, trade and business institutions, small business representative bodies and those in support agencies. | http://www.sagepub.com/journalsProdDesc.nav?prodId=Journal201573 |
| JSBM | The primary purpose of the Journal of Small Business Management (JSBM) is to publish scholarly research articles in the fields of small business management and entrepreneurship. As the official journal of the International Council for Small Business (ICSB), the JSBM is recognized as a primary instrument for projecting and supporting the goals and objectives of this organization, which include scholarly research and the free exchange of ideas. The journal, which is circulated in 60 countries around the world, is a leader in the field of small business research. | http://www.blackwellpublishing.com/journal.asp?ref=0047-2778&site=1 |

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| ETP | Entrepreneurship Theory and Practice (ET&P) is a leading scholarly journal in the field of entrepreneurship studies. The journal's mission is to publish original papers which contribute to the advancement of the field of entrepreneurship. ET&P publishes conceptual and empirical articles of interest to scholars, consultants, and public policy makers. Most issues also feature a teaching case. Article topics include, but are not limited to:<br>• National and International Studies of Enterprise Creation<br>• Small Business Management<br>• Family-Owned Businesses<br>• Minority Issues in Small Business and Entrepreneurship<br>• New Venture Creation<br>• Research Methods<br>• Venture Financing<br>• Corporate and Non-Profit Entrepreneurship | http://www.blackwellpublishing.com/journal.asp?ref=1042-2587 |
| JBV | The Journal of Business Venturing: Entrepreneurship, Entrepreneurial Finance, Innovation and Regional Development provides a scholarly forum for sharing useful and interesting facts, theories, narratives, and interpretations of entrepreneurship and consequences of entrepreneurship.<br>The journal aspires to publish ideas that deepen our understanding of, and ultimately impact, the entrepreneurial phenomenon in its myriad forms. We seek papers (1) that are grounded in the practice of entrepreneurs, innovators, and their support systems; and (2) that address issues useful to scholars, educators, enablers, and practitioners of the entrepreneurial phenomenon. The journal welcomes pluralism in approach, methods, and disciplines. | http://www.elsevier.com/wps/find/journaldescription.cws_home/505723/description#description |
| MS | Management Science is a scholarly journal that publishes scientific research into the problems, interests and concerns of managers. Priority is given to papers that reveal novel concepts of broad interest to the management research community.<br>Our scope includes articles that address management issues with tools from traditional fields such as operations research, mathematics, statistics, industrial engineering, psychology, sociology and political science, as well as cross-functional, multidisciplinary research that reflects the diversity of the management science professions. We also publish relevant articles and seek to stimulate research in emerging domains, such as those created by economic globalization, public policy shifts, technological improvements and trends in management practice. | http://mansci.pubs.informs.org/amission.html |
| HBR | The Harvard Business Review has one goal: to be the source of the best new ideas for people creating, leading, and transforming business. Since its founding in 1922, HBR has had a proud tradition as the world's preeminent management magazine, publishing cutting-edge, authoritative thinking on the key issues facing executives. HBR's articles cover a wide range of topics that are relevant to different industries, management functions, and geographic locations. They focus on such areas as leadership, organizational change, negotiation, strategy, operations, marketing, finance, and managing people. While the topics may vary, all HBR articles share certain characteristics. They are written for senior managers by experts whose authority comes from careful analysis, study, and experience. The ideas presented in these articles can be translated into action and have been tested in the real world of business. Proposals for articles demonstrating fresh thinking that advances previous knowledge—whose practical application has been thought through in clear, jargon-free language—are those most likely to meet our readers' needs. When evaluating an idea, our editors often look for two things first—what they call the "aha!"—How compelling is the insight?—and the "so what?"—How much does this idea benefit managers in practice? | http://harvardbusinessonline.hbsp.harvard.edu/b01/en/common/util_contact_guidelines_hbr.jhtml;jsessionid=M1AENGVTYXKAGAKRGWDSELQBKE0YIISW |
| SMR | The most trusted source of useful and innovative ideas for business leaders<br>MIT Sloan Management Review is a business journal that bridges the gap between management research and practice, evaluating and reporting on new research to help readers identify and understand significant trends in management.<br>SMR is published by the MIT Sloan School of Management, which consistently ranks as one of the world's top business schools. The Sloan School is internationally recognized as a leading center for management innovation and a training ground for many of the world's top CEOs, CFOs, CIOs, and entrepreneurs.<br>Since its founding in 1959, MIT Sloan Management Review has been a venue for business-management innovators from MIT and elsewhere — authors such as Peter Senge, Lester Thurow, James Brian Quinn, Gary Hamel, Thomas Davenport, Christopher Bartlett, Sumantra Ghoshal, John Quelch, Henry Mintzberg, Max Bazerman, and Ed Lawler.<br>A peer-reviewed quarterly, the journal covers all management disciplines, although its particular emphasis is on corporate strategy, leadership, and management of technology and innovation. SMR accepts approximately 7 percent of submitted articles.<br>SMR editors work closely with authors to ensure that articles provide interpretation and analysis for practicing managers: thought-provoking strategies that offer real-world management solutions. | http://sloanreview.mit.edu/smr/about/ |